MECHANIX ILLUSTRATED

THE HOW-TO-DO MAGAZINE

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This man is a "security risk"!

Age, 29. Married. Two children. High school education. Active in local lodge, church, veterans' organization. Employed by large manufacturing concern. Earns $82 a week.

SOUNDS like an Average Joe. And he is. Too average! He's got a job. It pays fairly well. He's satisfied.

But here's the catch. With the right kind of training, this young man could be stepping into better jobs. He could be making $7-8000 a year. He could be cashing in on those spare-time hours he now wastes.

As it stands now, he's stuck in his job. Can't seem to make any headway. He's reluctant to try. So he just hangs on.

This man is a "Security Risk" to his wife and children.

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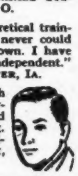

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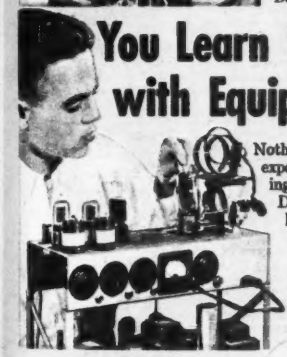

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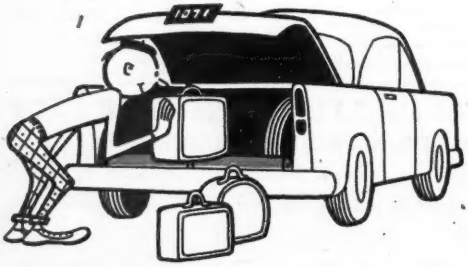

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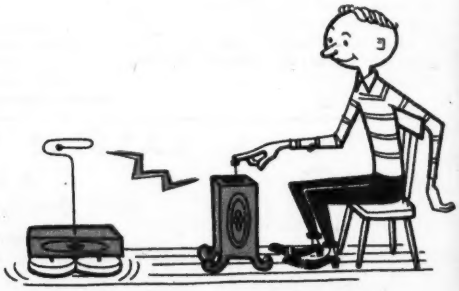

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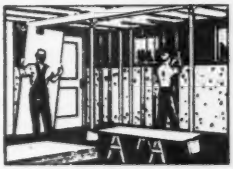

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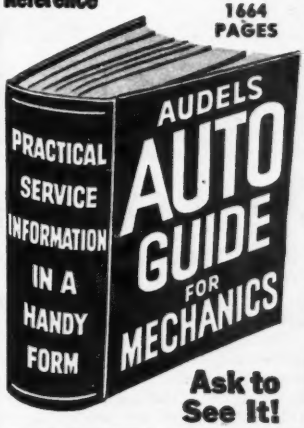

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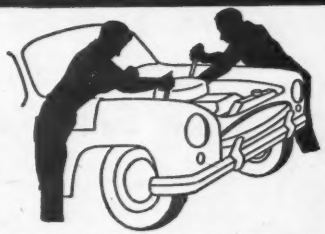

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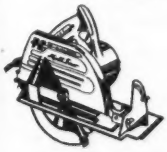

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Invention Clinic

Joseph H. Kraus

In this column each month Mr. Kraus will answer as many letters as space permits on those subjects he feels to be of widest general interest. Time does not allow him to reply to any letters except those printed here. Address your questions to the Invention Clinic, *Mechanix Illustrated*, 67 West 44 St., New York 36, N. Y.

Automatic Envelope Sealer

Herman Miehle of Long Island City, N. Y., has submitted a photo of an electric machine which seals 200 to 300 envelopes per minute regardless of thickness. He says that the machine could be sold at a profit for $39.50. He thanks this department for advice we "so wonderfully gave in the past." What about his new invention?

Again you have come up with an excellent item. Although it will work well without a hopper feed, I recommend a hopper. Not everyone who uses the machine will have the skill you have developed in feeding the sealer. You could, for example, include the hopper as an extra at $3.00 to $5.00 and still maintain your present sales price. Also you may need to add rubber hose or tubing to your rollers to lessen slipping, but this would add little to the cost because it would save on machining. A water well might help toward a full day of operation. This could be a bottle and a wire bottle holder, or your sponge-holder could be flared at the top to form the well. This machine might even be patentable, and should sell well to smaller business houses. Experiment with the suggested changes, have a search made, apply for a patent if the report is favorable. Meanwhile get into production. Let me know how you make out.

Window And Door Jamb Flusher

Francis Lambert of Plattsburg, N. Y., has designed and built a power tool which can be used in flushing window and door jambs, leaving no corners to hand plane. Will this sell well?

As this tool would be an attachment to many different power tools, it might meet with a market. Its price certainly suggests that you should explore the matter further. I recommend an immediate patent search. If the report indicates that you stand a good chance for a patent grant, you should consider trying for one—a gamble worth taking. Next try to get one of the power tool manufacturers to produce and sell the item, making sure of a guaranteed minimum annual royalty or outright sale. Best results over a long period would be by handling the distribution and sale through an organization which would make the tool available to all power tool manufacturers.

Folding Wedge

A. B. Wink of Los Angeles, Calif., sent in a sample of a folding wedge to be placed under the wheel of a car to keep it from rolling when parked on a hill or when changing a tire. Would this be a good mail order item at $1.50?

I recommend that you redesign the item for strength, have the records searched, make up a dozen or so samples, put them up for sale at some local store and learn the reaction for yourself. If results appear favorable for both patent and sale, apply for a patent. But you must do this within a year after you first put your article on the market, so make all preparations with this goal in mind.

When I tested the sample it collapsed, due to no inherent fault of your design. The material just wasn't strong enough. Corrugations running lengthwise would increase strength but a heavier gauge would be better. A double supporting arm would make the item five times as strong without raising costs materially. The item should be made of stainless steel, or paint-dipped or coppered, to minimize rusting. The novelty here is in the folding feature; your unit offers no real advantage over a rope-harnessed wood chock. And it would freeze to the ground more tightly

[*Continued on page* 22]

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

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Invention Clinic

[*Continued from page* 20]

during adverse weather conditions. You might try to improve that.

You have little chance for selling the patent, it seems to me. You will have to manufacture and market yourself.

Electric Cord Plug

Richard T. Morton of Maryville, Tenn., sends a design for an electric cord plug with finger grips. Should he apply for a patent?

There's a plug on the market made exactly like yours except that the grips do not fold and even that feature has been available in the past. Many other styles of easy-pull plugs are now on the market.

Selling Inventions

Edwin T. Jennings of Houston, Texas, wants to know how he can protect an idea before contactng a prospective buyer. How can he find a buyer? Does he need a working model? In short, what is the correct way to handle an invention?

The only way to protect an idea is to patent it. You will need a patent before you know just what it is you hope to sell, and the buyer then also knows what distinct feature you are offering him. In rare instances you might be able to sell an idea, but then it is difficult to negotiate to the point where the buyer and you develop enough confidence in each other to be willing to enter into an agreement which will be binding and which would call on you to establish proof of ownership to what you imagine is your original idea. As for finding a buyer, you should first try to contact manufacturers who are in the field toward which your invention is aimed. You can find a list of American manufacturers at libraries, or locate some of them in the classified sections of telephone books. Your next approach should be toward manufacturers who produce somewhat related products and who might like to add your invention to their lines. After that turn your invention over to an agent. A model will help you put your points across quickly and convincingly. Finally you should recognize that there are some fields in which it is almost impossible to do anything, regardless of how good your invention may be. For example, a major part in an auto, such as a transmission, engine or suspension, or a new piano and its action would be virtually impossible to sell. There are many more such closed fields.

[*Continued on page* 26]

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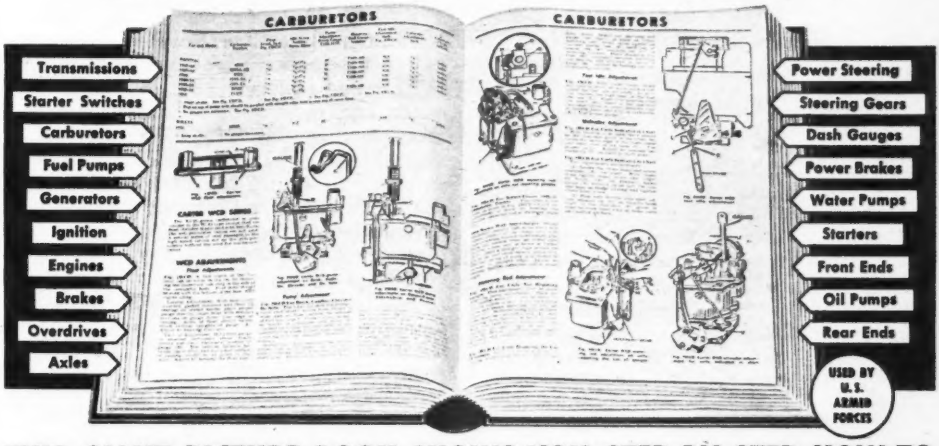

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Conquest of Space

Eyes of the Rocket Range

By G. Harry Stine
Chief, Navy Range Operations, White Sands Proving Grounds

WHEN a rocket thunders upward from White Sands Proving Ground headed for outer space, many devices are trained on it. Radar's electronic eye follows it. Radio telemetry tells what is going on inside the rocket. Electronic trajectory devices bearing such odd names as Dovap, Miran, and Tipsy peer through clouds and haze, searching out the rocket's course.

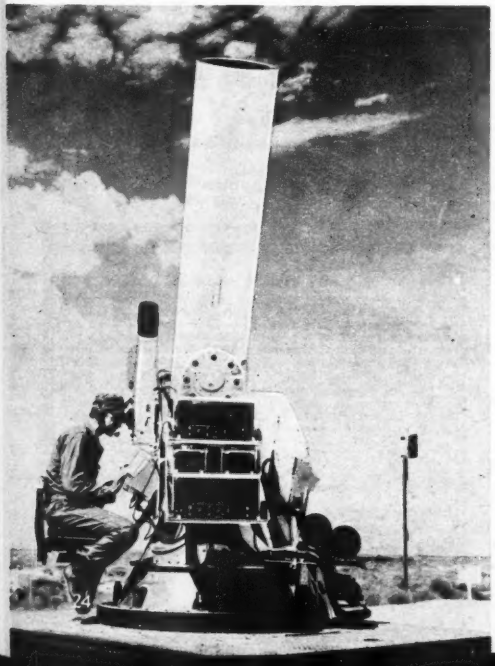
But by far the most important devices are ordinary cameras. These movie cameras, however, are attached to some of the most advanced optical and telescopic devices yet devised by mankind.

There is no more accurate way of determining the course, velocity, attitude and performance of a rocket in flight than taking a picture of it. When thousands and thousands of these pictures are pieced together, they can provide a veritable mine of information—position in space to within ten feet, velocity to within five feet-per-second, attitude or orientation of the rocket to within one degree, roll rate to within 30 degrees per second or better.

To do each of these jobs, special cameras are used. Let's take a look at what might be used to cover a single rocket firing at White Sands Proving Ground.

Clustered around the launcher, in addition to the photographers with their standard still and motion picture cameras, may be as many as three special cameras known as "Fastax" cameras; these fantastic devices can take pictures at the rate of 3,000 frames per second! It is their job to record the first few seconds of a rocket's flight as it leaves the launcher. Fastax films shown at standard speeds are super-slow-motion. You can practically see the individual flames in a rocket exhaust. The use of the high speed cameras which can whip off a 1,000-foot roll of film in seconds is obvious; rocket men can study these films and get a glimpse of their bird in action in a way they never could with their eyes.

Once in the air, the rocket's initial trajectory is covered by "ribbon frame" cameras, sometimes known as Bowen-Knapps. These cameras are fixed and photograph the missile in relation to a set of target poles next to the cameras; the angles to the targets on the poles are known to [*Continued on page* 27]



FAR-SEEING tracking telescope can pinpoint missile 300 miles up with 160-inch lens.

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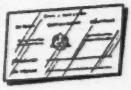

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Invention Clinic

[*Continued from page 22*]

Tire Deflation Alarm

W. H. Cooper of Augusta, Ga., has a device to give an alarm when an auto has a flat tire. How can he protect himself until the item is ready for the market?

A patent is your only protection. A search will disclose to you that there are already some 20 or 30 different patents relating to this same subject, but maybe yours is better. As you did not furnish diagrams or a description I can only suggest that you have a search made by an attorney to learn if you have something original. None of the patents which we have seen in this class strike us as being effective under all weather, road and driving conditions. In some the signal would be tripped when the tire hits a bump, or the auto runs on a muddy surface. Some signal with air and deflate the tire further; some provide for automatic inflation while the tires are in motion. If you do not yet have a design in mind you might contract with some firm or individual to undertake the experimental work for you. Then his ideas could become your property. He would be required by

[*Continued on page 28*]

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PATRICK D. BEAVERS
Registered Patent Attorney
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Eyes Of Rocket Range

[*Continued from page 24*]

great accuracy. These cameras are also fast and take several frames per second.

The job of determining where the rocket is in the air during most of its flight falls to a special group of cameras known as photo-theodolites. They are cameras attached to small telescopes which are mounted on devices to record very precise angles. The most common type of photo-theodolite is the Askania, made in Germany and extremely precise. Nobody in this country would undertake to make a Chinese copy of it for less than $100,000.

Askanias require two men for operation—one man tracks in azimuth, the other in elevation. Timing signals are recorded to mark accurately when each frame was taken, and the azimuth and elevation angles of the camera are recorded on the film itself along with the photo of the rocket. Film speeds are rather slow—about six to 12 frames per second—but the accuracy more than makes up for it.

While in the air, other special cameras record things known as "attitudes and events." What was the angle of the rocket? Was it rolling? When did its rocket stop working? What was that funny puff of smoke in the tail section? These questions of the rocket men are answered by the long-focus instruments, the telescope cameras. And that's just what they are, telescopes, some of them designed by astronomers such as Clyde W. Tombaugh, the discoverer of the planet Pluto.

The first tracking telescope—known as Bright Eyes I—was the first device ever to record what happened to a V-2 rocket in flight outside the atmosphere. With the biggest WSPG telescope, a 16-inch monster, it is possible to take pictures of a rocket like the V-2 or Viking 100 miles in the sky with such clarity that you can read the numbers on the fins!

Other special cameras are used at WSPG. One of the most spectacular of these is the Igor—signifying Intercept Ground Optical Recorder. The famous photos of the Nike guided missile destroying a B-17 bomber were made with an Igor. The specialty of these Igors is recording miss distance or how far the mis-

[*Continued on page 29*]

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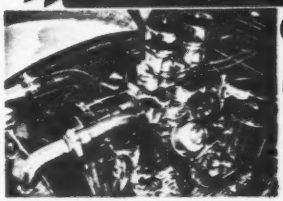

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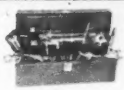

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Invention Clinic

[*Continued from page* 26]

agreement with you to apply for the patent and assign all rights to you, or you might even be joint inventors with his share assigned to you. You should consult your attorney about details.

Saucer Design

Robert L. Garien of Concord, N. H., has a design for a saucer with a raised cup-holding area and a surrounding depression, the idea being to prevent drip from the bottom of the cup. What are its chances?

Dozens of dripless saucers have been designed and patented. Your saucer is structurally weak and unless the user sets his cup down carefully on the mound it will tilt and spill. If he can be that careful he won't need a patent saucer. Use your ingenuity on something else.

Auto Driving Control

Arthur Lee of Fairfield, Conn., suggests a stick-type driving control for the automobile. What do we think?

The old electric cars had such a control, so fundamentally you have nothing new. But there is a possibility that you might be able to patent the interrelation of the parts for your system. Let us assume that you can. What do you intend to do with the patent after you get it? Obviously, if this is not taken over by a manufacturer you could do nothing with it. •

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Eyes Of Rocket Range

[*Continued from page 27*]

sile was from its target. Of course, it takes two or more Igors to do this, but WSPG has lots of them.

Terminal telescopes are just what their name implies. They are built and situated to record the final stages of a rocket's flight, such as in the case of a ballistic rocket carrying a warhead like the Corporal or Honest John.

Ballistic cameras are the most accurate of all at White Sands. They are fixed cameras and are mostly used at night to photograph a rocket's flight as a streak of light against the background of stars whose positions are very accurately known. Many critical firings are made at night just to get coverage from ballistic cameras.

An average day will see all these special cameras whip through 30,000 to 50,000 feet of a special 35mm film known as Linagraph Shellburst, chosen for its contrast and speed. Special film processing facilities are available for developing the miles and miles of film ranging from 16mm up to special films six inches across. The WSPG film lab processes several million feet of film a year, making it a close competitor to Hollywood.

Most of the film is stamped Confidential or Secret, and the public never sees it. And neither do other people across the oceans who would give a lot for it.

Truly, the optical instruments on a rocket proving ground are its most important asset. What's coming in the near future? Well, that's hard to say right now, but television on the cameras may replace the film to a great extent. New telescopic methods have already been developed for very accurate data gathering on satellites; it is possible with existing techniques and equipment to photograph a rocket such as the V-2 at the distance of the moon!

So when you read in the newspapers that a rocket firing was cancelled because of weather, you now know that it was because clouds or haze closed the eyes of the rocket range, the optical instrument! •

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• *Volunteers!*

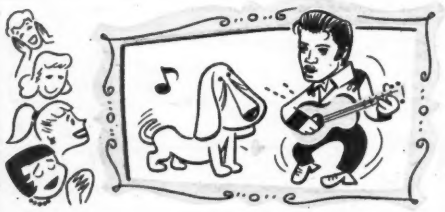
The International Aircraft Spotting Association has recently been formed and is in urgent need of new members in order that it may arrange for competitions. We hope to present the competitor with the highest individual score a trophy by the end of the year. We would be pleased to hear from any MECHANIX ILLUSTRATED readers who are interested in joining.

Jean-Marie Cousineau
International Aircraft
Spotting Association
14 Martineau Street
Ottawa 2, Ontario

• *Houn' Dawg, Houn' Dawg*

If you would like to sell more magazines, why don't you have Alexander Sutor (You Name It—He'll Frame It, Jan. '57 MI) design a special frame that Elvis Presley fans could use for framing mementos of their hero?

Marty Burnett
Dayton, Ohio



• *Owns Own Slave*

I got quite a chuckle from your story You'll Own "Slaves" by 1965 (Jan. '57 MI). I own a slave in 1957—my wife. I never have to worry about dishes, cleaning, a night out, etc. Like everything else, she's not perfect, of course. But the whip helps!

Harry Carp
Brooklyn, N. Y.

• *Swiped Hub Caps*

Saw your Car Kinks page (Nov. '56 MI) and noticed the item about keeping a record of the changing of tires, etc., in the hub caps of the car. How can you keep

your caps from being stolen as they so often are today?

Sgt. Clyde E. Boggs
U. S. Army, Japan

Booby traps, Sarge?

• *January Mystery Solved*

You get six cigarettes from the 36 butts and one more from the six butts from these. Thus the impecunious editor enjoys seven cigarettes from the 36 butts.

G. W. Tomecko
Storrs, Conn.

[*Continued on page* 32]

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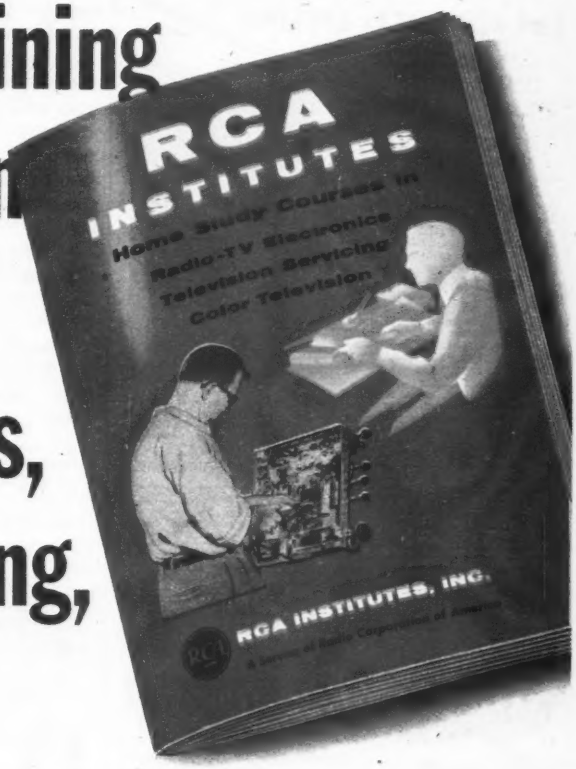

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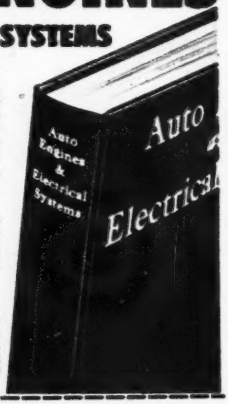

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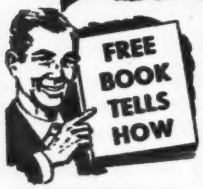

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Dear Editor

[*Continued from page* 30]

• *MI's March Mystery*

"How many steps are there in sight on this escalator?" a woman asked her husband.

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When she reached the top she reported she had taken just 21 steps. He had taken 28. How many steps were in sight at one time on the moving staircase?

Puzzle taken from Mathematical Puzzles for Beginners & Enthusiasts by Geoffrey Mott-Smith, published by Dover Publications.

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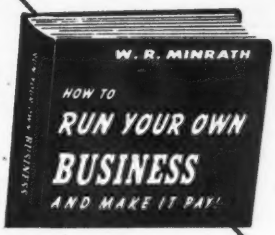

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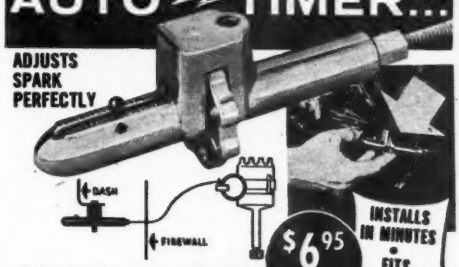

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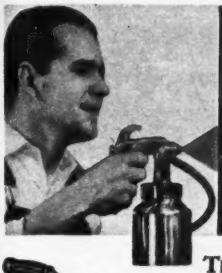

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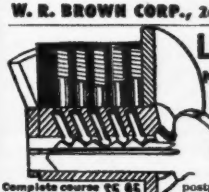

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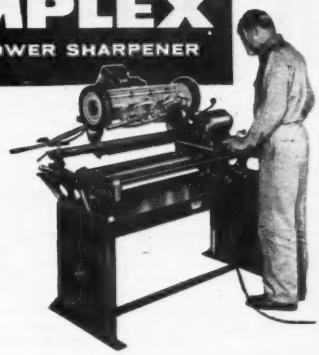

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Your advertisement can reach this mail-buying audience of more than a million readers for only 90c per word . . . payable in advance (Check or M.O. please) . . . minimum 10 words. Copy to be inserted in May issue must be in the office March 3. Mail to MECHANIX ILLUSTRATED, 67 West 44th St., New York 36, N. Y. Word count: Zone number free. Figure one word: Name of state (New Jersey), name of city (New York); sets of characters as in key (14-D); also abbreviations as 35MM, 8x10, D.C., A.C.

SAVE MONEY • ORDER BY MAIL

• • • ADVERTISING & BUSINESS SERVICES

ADVERTISE: 24 WORDS, 100 Canadian Newspapers, $5.50. Lists Free. Advertising Bureau, 10511-B Springfield, Chicago 43.

ADVERTISING POST Cards: 150 Words Printed On 1,000. $7.00 Postpaid. Nolan Printing, Box 5475, Chicago 7.

• • • AGENTS WANTED

MAKE EXTRA Cash—Quickly! Show newest big value $1, $1.25, $1.50 assortments of Birthday, Get Well, Easter Greeting Cards, Gift Wrappings, Stationery, Gifts—in spare time. Big profits, bonus. Friends, others buy on sight. Write for Samples on approval, Free Gift Offer, details. Hedenkamp, 361 Broadway, Dept. MI-43, New York.

MEN-WOMEN AGENTS: Sensational new moneymakers—Beautifully hand-painted plastic personalized photo enlargements, compacts, rings, bracelets, lockets, etc. Simply take orders, pocket 40% commission—we deliver and collect. Sales outfit free. Novelco, 3343 North Avenue, Chicago 47.

RUN SPARE-TIME Greeting Card and Gift Shop at home. Show friends samples of our wonderful new 1957 All-Occasion Greeting Cards and Gifts. Take their orders and earn up to 100% profit. No experience necessary. Costs nothing to try. Write today for samples on approval. Regal Greetings, Dept. 23, Ferndale, Mich.

YOU CAN Make Money at home in spare time taking magazine renewal subscriptions. No capital or experience necessary. All supplies furnished. Write Today! McGregor Magazine Agency, Dept. 520A, Mount Morris, Ill.

EVERY MAN a prospect. Request Free Sales Kit. Show line of belt buckles, individualized with your own name and emblems, also transportation, police, firemen badges. Choice 3,000 emblems. Hook-Fast, Box 1425-MI, Providence, R. I.

PRINTING, ADVERTISING Salesmen—Excellent moneymaking sideline selling Decalcomania Name Plates, small quantities. Automobile initials, Sign Letters. Free Samples, "Ralco," XL, Boston 19, Mass.

YOUR OWN business—Suits $1.50; Overcoats 65c; Mackinaws 35c; Shoes 12½c; Ladies' Coats 30c; Dresses 15c. Enormous profits. Catalog Free. Nathan Portnoy Assoc., 605-M West 12th Place, Chicago 7, Ill.

BUY WHOLESALE thousands nationally advertised products at big discount. Free "Wholesale Plan." American Buyers, Hertel Station, Buffalo 16-W, N. Y.

BUY WHOLESALE! Discounts to 80%! Appliances, Cameras, Sporting Goods, Housewares, Watches, Tools, Clothing, etc. Buy Rite 73-27, Wagaraw, Hawthorne 2, N. J.

CLEANS WINDOWS without mess. Strange "dry" cleaning-cloth. Replaces liquids. Windows gleam. Samples sent on trial. Kristee 64, Akron, Ohio.

BUY WHOLESALE, 25,000 Items, Catalog 25c. Matthews, 1472-D6 Broadway, N. Y. C. 36.

FREE "$5,000-$45,000; UNLIMITED Vacations." Work home! No merchandise, equipment! Haylings-MI, Carlsbad, Calif.

YOUR OWN Wholesale Business Without Investment. Free catalog. Norris, 487-J Broadway, New York.

AMAZING "CUT Flowers" Greeting Cards sell fast! So real even stems are cut. Keep 85¢ on each $1.25 Everyday Assortment. $85.00 easy! 140 finest card, novelty, stationery money-makers. Gift Bonuses. Assortments on approval. Act fast—get "Hot Plate" Salt-Pepper Free! Creative, 4401 Cermak, Dept. 513-F, Chicago 23.

$125 WEEKLY! 176% PROFIT! New wonder Car Polish with Miracle Dow-Corning silicones cleans, glazes, weatherproofs year 'round! Free sample, details. Write Royaltone Co., 1035 E. 10th St., Brooklyn 30, N. Y.

GOLD OR Silver Letters, Numbers. Windows, Doors, Trucks. 1" to 6". 500% Profits—Free Samples. Atlas-R, 544 West 79th, Chicago 20.

60% PROFIT ON Cosmetics—famous nationally advertised Hollywood cosmetics pay 60%. Make $25.00 day up! Hire others. For free samples, details, write Studio Girl, Glendale, Calif., Dept. 5073G.

GREETING CARDS—$50.00 cash from 40 boxes sensational All-Purpose Assortment. Big money all year from special occasion cards—Mother's, Father's Day, Birthdays, Eastern Star. Best All-Occasion Assortments, Stationery, Gifts. Bargain Specials. Color Catalog. Samples on approval. Midwest, 1113 Washington, Dept. 678-C, St. Louis 1, Mo.

EASY HANDWORK makes fast-selling articles. Sample free. Sunmade Company, Brockton 64, Mass.

MEN, WOMEN, Make Money Spare Time plus New Car as Bonus for Encouragement. Amazing hosiery Guaranteed to wear without holes, snags, and runs, or replaced Free. For example, lovely 60 gauge nylons Guaranteed for as long as 1¼ years, or replaced Free. Write Wilknit, 1873 Wash., Greenfield, Ohio.

BUY WHOLESALE $1,350,000 Products. Literature Free. Carter, Box 6011-M, Chicago 80.

FREE! BEAUTIFUL Feather Pictures 200% Profit! Apartado 9036, Mexico 1, D. F.

WAXES FLOORS Without "Wax." New invention. No more floor wax to buy. Sensational seller. Samples sent on trial. Kristee 63, Akron, Ohio.

FREE CADILLAC, $10,000 yearly. Cars, appliances wholesale. Strateway, 6228-S, Charlotte 7, N. C.

FREE! "301 PROFITABLE Small Businesses!" Amazing shoestring plans! Work home! Start sparetime! Daumant Surveys, Kenmore 23-MI, N. Y.

CALIFORNIA SWEET-SMELLING Beads. Sensational sellers. Free particulars. Mission, 2328GF West Pico, Los Angeles 6, Calif.

SELL NAMEPLATES, Desk Signs, Free Sample. Whitney Nameplates, West Springfield, Mass.

DISTRIBUTORSHIPS OPEN. Low cost unbeatable English Chamois. Chamtana Tannery, Hudson Falls, N. Y.

IF YOU'RE interested in making money in selling, see the hundreds of exceptional opportunities in Salesmen's Opportunity Magazine. Send name for your copy, absolutely free. Tell us what you're selling now. Opportunity, 848 N. Dearborn, Dept. 51, Chicago 10, Ill.

$1,000.00 A MONTH for making dramatic 3-second demonstration of amazing lightweight Presto Fire Extinguisher. New chemical used by Airforce snuffs out fires instantly. Only $4.95. Terrific commissions. Millions want it. Free Kit. Merlite, 114 E. 32nd, Dept. P-72T, New York 16.

BOOK "505 ODD, Successful Businesses" free. Work home! Pacific-21C, Oceanside, Calif.

• • • SALESMEN WANTED

MY FREE Outfit Puts You In A Fine Business! Just 2 sales a day brings you up to $217 extra a month in Big Money shoe business! Complete line of Air Cushion shoes for men, women. Just rush postcard for your powerful Free Selling Outfit! Mason Shoe, Dept. C-53, Chippewa Falls, Wisc.

NEW JOBS open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide, listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity, Dept. 19, 850 N. Dearborn, Chicago 10.

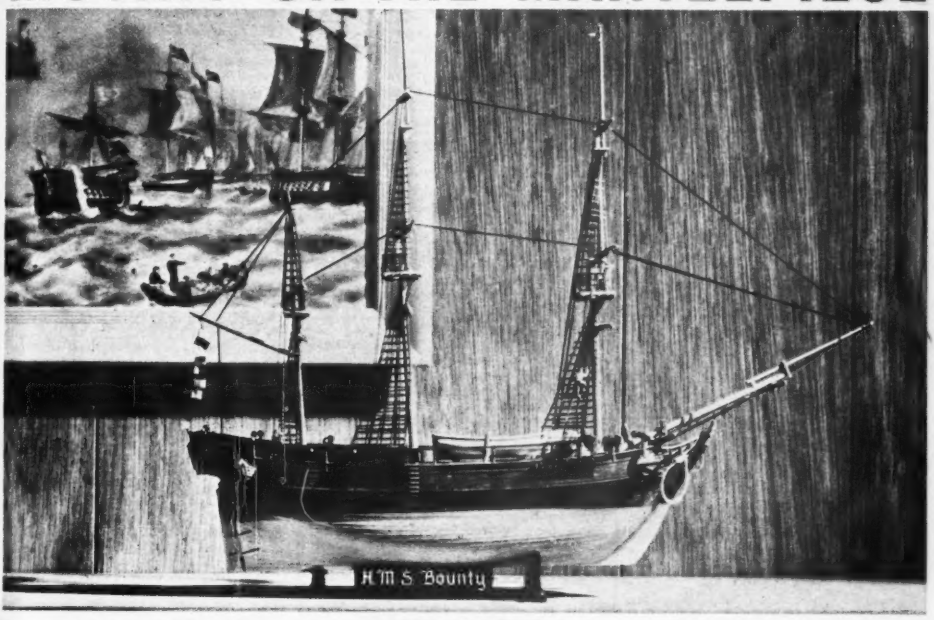
EXCLUSIVE LINE of personal initialed buckles, belts, cap badges, 3,000 emblems, etc. Hook-Fast, Dept. MI, Roanoke, Va.

GET NEW Shirt Outfit Free: make $90.00 weekly on 5 average orders a day. Famous quality Made-To-Measure dress and sport shirts at $3.95 up sell fast to all men. No experience needed. Full or part time. Write: Packard Shirt Co., Dept. 439, Terre Haute, Ind.

AMAZING "DOLLAR-A-SECOND" demonstration of new footwear sensation can bring you $150 weekly! Send shoe size for pair on approval, plus Triple Profit Plan. Flexiclogs, Box 26X-C, New Holstein, Wisc.

MONEY-MAKING OPPORTUNITY! Take big profit orders for world famous Patented Varieties Fruit Trees. Also Flowering Shrubs, Roses, Vines. Big Sales outfit Free. Stark Bro's, Desk 30137, Louisiana, Mo.

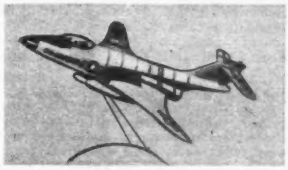
MUTINY ON THE MANTELPIECE



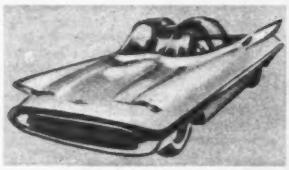
NEW H. M. S. BOUNTY MODEL KIT

ONLY REVELL COULD MAKE IT SO REAL!

You can practically hear the mutinous crew snarling at Captain Bligh. . . that's how real this model of the Bounty looks when you put it together from the new Revell Authentic Kit! Every detail is shipyard accurate. Even the mounted cannon, the ship's launch, the ratlines and rig are in perfect scale. Five sculptured figures of crew and Capt. Bligh are included. Revell gives you step-by-step plans, a display stand and nameplate to mount your 14⅜" ship model on when it's finished. Put it on your mantelpiece. HMS Bounty Kit, $2.98.



McDONNELL VOODOO F-101A — Here's the mighty jet fighter that slices the sky at speeds faster than sound—scaled down from Air Force blueprints for you to put together. Swept-back wingspan, 6¼", with action-accurate details like landing gear, flaps, mounted armaments, pilot figure. With base, 89¢.



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SEND THIS COUPON TO GET BIG 32-PAGE REVELL CATALOG—ONLY 25¢ (Stamps or Coin)
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CITY _____ ZONE _____ STATE _____

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MI CLASSIFIED ADVERTISEMENTS

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MAKE EXTRA Money. Cash commissions. Everybody buys easy-to-sell Advertising Book Matches. Union label. Big variety—Glamour Girls, Scenics, Hillbillies. Powerhouse selling kit Free. Steady repeat business. No experience necessary. Superior Match Co., Dept. F-357, 7528 S. Greenwood, Chicago 19.

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$1,000.00 A MONTH for making dramatic 3-second demonstration of amazing lightweight Presto Fire Extinguisher. New chemical used by Airforce snuffs out fires instantly. Only $4.95. Terrific commissions. Millions want it. Free Kit. Merlite, 114 E. 32nd, Dept. P-72T, New York 16.

GOLDMINE OF 600 money makers. Copy free. Specialty Salesman Magazine, Desk 7-B, 307 N. Michigan, Chicago 1.

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ANALYZE HANDWRITING for more income, prestige, success. Graduates making money, spare, full time. Many on TV, have own radio shows, write feature columns for newspapers. Others like Marge Alten, Detroit; Sam Johnson, Texas; Dr. Kraak, Tucson, featured in widely read columns. Real opportunity for intelligent men and women. Age no handicap. Sample lesson, illustrated, sent on request. Must be 21. Write today! IGAS, 2307 National Station, Department 614, Springfield 4, Mo.

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FIX TYPEWRITERS. Inexpensive home course teaches Factory Secrets. Free Booklet. Write, Typewriter, Tarentum 3, Penna.

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START A Buying Service, buy wholesale thousands nationally advertised products. Make big profits selling at sizeable discounts. Postcard brings details. American Buyers, Hertel Station, Buffalo 16-Y, N. Y.

FREE FOLIO "$5,000-$45,000; Unlimited Vacations." No merchandise, equipment. Unknown! Work home—sparetime. Haylings, MI, Carlsbad, Calif.

WANTED: HOME producers, to be subcontractors. Cast plastic products for manufacturers in our Clearing House Service. Thousands of easily-made items required. Cash in at home, without previous experience. Plastic Service Associates, Dept. 3-MI, East Boston 28, Mass.

GROW ORCHIDS at home—profitable—fascinating. Year 'round, Maine to California. No Greenhouse. Gorgeous Cattleyas, Cymbidiums, etc. Successful home grower shows you how. Free—full details. Flowerland, 100 South Vermont Avenue, Los Angeles 4, California.

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YOU CAN become an Associated Discount Distributor, operating mail order discount business. Offer gifts, appliances, cookware, housewares, cutlery, dinnerware, silverware, jewelry, watches, etc., at discounts to 75%! No stock investment. We drop ship your orders. Catalogs printed your name can cost you nothing. Postcard brings free sample catalog, all details. Topval Corp., Lindenhurst 429, N. Y.

YOUR OWN name brand business. No investment; no inventory. Part time or full time. Sell famous brands of appliances, housewares, silverware, radios, vacuum cleaners, lamps, tools, clocks, watches, jewelry, etc., etc., over 1,000 items. Join thousands of successful independent dealers. Send for Free catalog and dealer price list. H. B. Davis Corp., Dept. 16, 145 W. 15 St., New York City.

LEARN SEWING Machine Repairing. To $125.00 weekly. Sparetime. Supplies. "Add to present business." Write today! Taylor Service, Box 2126, San Bernardino, Calif.

LEARN PHOTO-NEGATIVE (Portrait) retouching. Men, Women. $5 hour possible spare or full time at home. Easy glamorous. Work for Photographers by mail order. Full details sent Free. Duval, 100 So. Vermont, Los Angeles 4.

FREE! "301 PROFITABLE Small Businesses!" Amazing shoestring plans! Work home! Start sparetime! Daumant Surveys, Kenmore 23-MI, N. Y.

$60 WEEKLY, SPARE Time—Easy! Home Venetian Blind Laundry. Free Book. Burtt, 2434C, Wichita 13, Kans.

BUY WHOLESALE! Discounts to 80%! Appliances, Cameras, Sporting Goods, Housewares, Watches, Tools, Clothing, etc. Buy Rite 73-28, Wagaraw, Hawthorne 2, N. J.

PRINT FOR Profit At Home. Amazing new method prints colorful posters, banners, greeting cards, glassware—anything. Hundreds at time. No press needed. No art. Fantastic profits! Need representative your area immediately! Free home-business plan. Screen Print, Dept. MH, Los Angeles 61, Calif.

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PROFITABLE MAIL order methods, ideas, opportunities. Clearly, authentically revealed in amazing new publications now available. Free details. Write: Wellington Publishers, Box 4157-D, Austin 51, Texas.

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MAKE ATTRACTIVE, durable, building plastic, easily. 800% profit. Exclusive District. Bays Laboratory, Oklahoma City 9.

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BECOME A Game Warden, or join Forestry, Park, Lookout, Wildlife Conservation services. Enjoy outdoor work, good pay, real security. Complete information Free! Write "Home-Study Institutes," 1036-KMH South La Brea, Los Angeles 19, Calif.

SHINE CARS Without "Polish." New invention. Lightning seller. Cars gleam like mirror. Samples sent on trial. Kristee 108, Akron, Ohio.

MAKE PERFUMES—Cleaners—Polishes—Cosmetics — Sell Mailorder. International, 6347 Parnell MI-37, Chicago 21, Ill.

IMPORT-EXPORT! OPPORTUNITY, profitable, world-wide, mail-order business from home, without capital; or travel abroad. Established World Trader ships instructions for no-risk examination. Experience unnecessary. Free details. Mellinger, G753, Los Angeles 24.

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8¢ RETURNS $1.00. AUTOMOTIVE Product. You manufacture. No machinery. We help sell it. (W. Va. reserved.) Wilson, Box 505-B, Princeton, W. Va.

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More local plants are needed to supply growing demand for Dunbrik. Each operates in franchise-protected territory with exclusive privileges. Manufacturing is easy; requires no experience or skilled labor. We supply all instructions. High profit potentials, with average mark-up of 100% on basic costs. Dunbrik machine available on lease or sale.

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Get maximum use of your vehicle with these famous hubs! They "take out" the front end in 2-wheel drive, give your vehicle "pick-up" economy, pep, speed, power, handling ease; stop front end gear whine, shimmy. 4-wheel drive as usual, when you need it—automatically, as you shift, with Warn Lock-o-matics, manually with Locking hubs. Models for all makes 4 w.ds. to 1½ tons at truck dealers everywhere, or write:
WARN MFG. CO., Riverton Box 6064-C3, Seattle 88, Wn.

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☆ Start a Buying Service at Home, SPARETIME. GET BIG-NAME MERCHANDISE FOR SELF AND CLIENTS UP TO 40% LESS THAN RETAIL PRICE. SALES EASY, AS YOU CAN GIVE SIZEABLE DISCOUNTS, STILL MAKE FAT COMMISSIONS. *Post Card brings FREE COPY "The Wholesale Plan".*

FREE! "THE WHOLESALE PLAN"

American Buyers Service

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Sell for up to $75 A PAIR

BREED EASY-TO-SELL TROPICALS AT HOME—IN FULL OR SPARE TIME

Imagine—up to $75 per pair paid for beautiful, exotic fish. Big demand constantly from hobbyists, stores, business offices, interior decorators, others. Earn up to $7.50 an hour in interesting, easy, home business.

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We supply complete instruction plus everything to get you started. Operate in living room, garage, anywhere; full or part time. No "big business" competition to worry about.

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COLORGLAZED CONCRETE pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leakseating. Moneymaking projects. Booklets, details free. Men only. National Pottery, Grand Rapids, Minnesota.

CASH FROM Sawdust (seventy methods). Tin-Cans (thirty methods). Newspapers (eighteen methods). Instructions 50¢ each. All three $1.00. Charles Company, 12-GXW, Norwood, Ohio.

FREE! 24 PAGE Catalog of Money-Making Opportunities. Coten, 7731-MI Yates, Chicago 49, Ill.

$50.00 DAILY REJUVENATING batteries instantly. Lightning seller. Sample $1.00. Refundable. Certified Laboratories, Charleston 29, S. C.

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FREE FOLIO—"97 Ideas to make a Million." Start small. Unusual! Artcraft, P. O. Box 8038-B1, West Palm Beach, Fla.

BIG PROFITS importing foreign products. Stock, capital unnecessary. Free details. James Vaughan, St. Petersburg 7-M, Fla.

MAKE $25-$50 WEEK, clipping newspaper items for publishers. Some clippings worth $5.00 each. Particulars free. National, 81-X, Knickerbocker Station, N. Y.

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11,000 NEW PROSPECTS Daily. Baby record books, shoes, albums. Sell mailorder. Use our literature. Write: No-Co-Ro, Capitola 16, Calif.

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MAKE $46 FROM Square Foot Plywood; Jigsaw necessary. Free Information. Woodets, Bridgewater, Mass.

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MOBILE, ALA., classifieds airmailed $1.00. Marre Co., P. O. Box 3463, Prichard, Ala.

IF YOU Want to earn money fast, I'll send you Free Sample Stocking Of newest Stretch DuPont Nylons to sell at only $1 a pair. American Mills, Dept. 605, Indianapolis 7, Ind.

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THOUSANDS NEEDED, highest pay, booming Ohio Valley's major industrial centers classified job listings. 3—$2. Airmailed. Box 1706, Parkersburg, W. Va.

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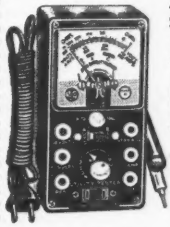

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Eric A. Fare, Libertyville 23, Illinois

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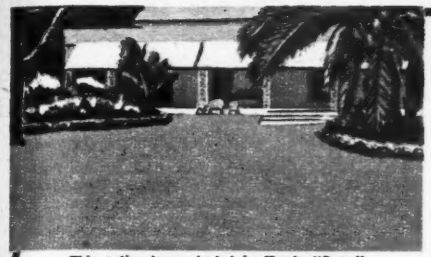

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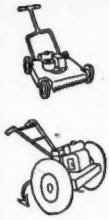

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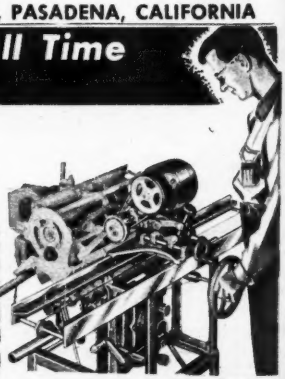

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Beware Home-Repair Gyps

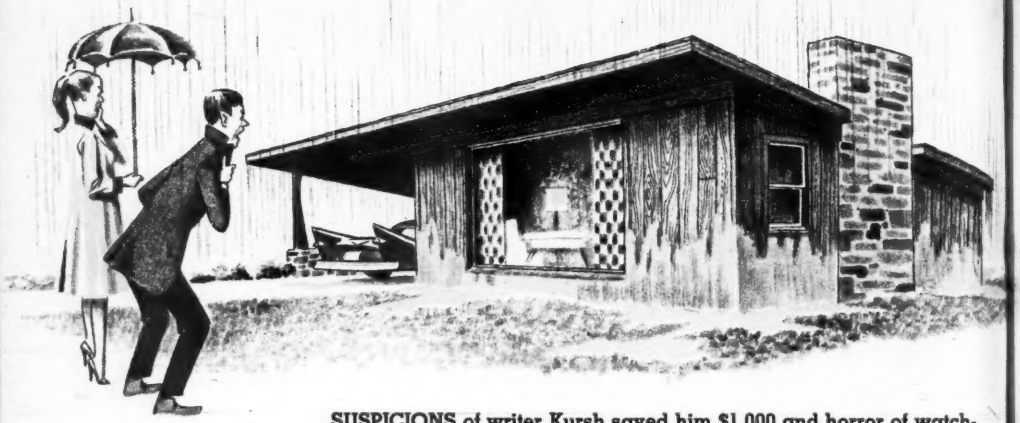
MI special features

ONE Sunday last spring I decided that the outside of my house needed painting and figured the job would cost about $750. I looked in my New York newspaper and saw a huge display advertisement hailing a new "paint" discovery.

I immediately filled out the coupon asking a representative from the company to call for an estimate and in

By Harry Kursh

GUARD against the immaculately dressed, glib salesman with the bulging briefcase who drives up in a slick new car and offers to give you an "incredible" bargain price.



SUSPICIONS of writer Kursh saved him $1,000 and horror of watching "new" paint on his house flake away after the first rain.

less than 48 hours a salesman pulled up to my front door in a slick new car. He was immaculately dressed and carried a bulging briefcase.

He explained in glowing terms the details of the "incredible mastic paint" which, he said, contained asbestos fibers and mica flakes which would be "air blasted" onto my house.

"It won't warp or peel," he said. "It will protect your house permanently against fire, water damage, drafts, moisture, termites and eliminate the need for painting for at least ten years."

"How about an estimate?" I asked.

"It'll cost you about $1,500," he said.

I whistled in surprise.

"Look," he said, "If you're really serious about this I can bring the price down one-third. My boss is anxious to get in this area. You have a nice house. Just let us use it as a model to show future prospects."

"That sounds fine," I nodded, as he shoved a stack of papers under my nose. "But wait a minute. I can't sign that fast. I'd like to see a house done with mastic paint."

"Oh, the only houses we've done thus far are on the West coast," he shrugged. "We're just breaking into the East and you're one of our first contacts."

"Well, I'll think about it and let you know," I told him. I wanted time to check his company with the Better Business Bureau.

A week later I got a letter from the New York Better Business Bureau warning me that if I signed to have my house mastic-painted I'd better get a lawyer and face the fact that I had gotten the short end of an outrageous swindle by a fly-by-night outfit whose guarantee was worthless. Later, I also learned that there was nothing new or amazing about mastic paint. It had been used for years but largely by industry to cover concrete block and brick walls and has to be carefully applied after costly preparation. When applied to wood siding, like my home and most

"SHUCKS, mister, we didn't know you had such a nice home," says salesman, talking Gullible Joe into buying storm windows three times as costly as in bait ad.

other homes, it would begin to flake and powder in the first rain and actually cause the wood to deteriorate rapidly.

I reported the results of my investigation to the New York newspaper and the gyp company's ads were barred from their columns. Unfortunately, however, countless thousands of home owners are still being rooked by the same mastic paint racket and thousands more by dozens of variations of home repair gyps.

"There's hardly a product or a service offered the home-owner today," says the Wall Street Journal in a recent home-repair business survey, "that some shady operator somewhere hasn't taken up. Almost any repair job, from $50 to $5,000, may attract a repair gyp."

Says Victor H. Nyborg, president of the Association of Better Business Bureaus: "Americans this year are spending an unprecedented amount on home improvement and the gyps are getting their share of it." According to Mr. Nyborg, before the year is out phonies knocking on your door will rake in some $500,000,000. And this is only a conservative estimate.

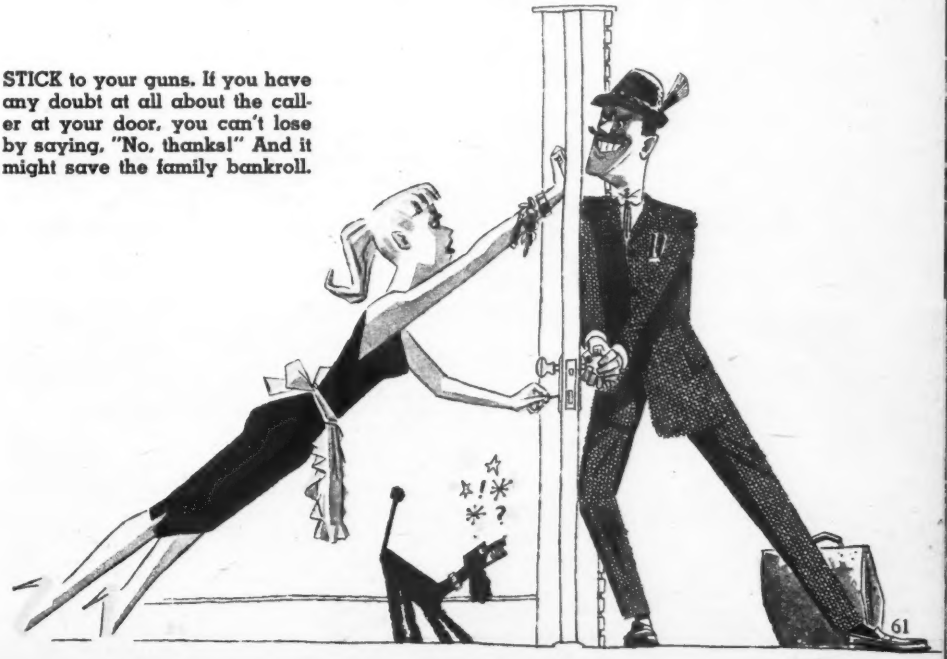
The most rampant racket is the one that almost hooked me—the "model home" angle. If it isn't "mastic paint," it is one of a thousand ingenious variations. Consider the one they pulled recently on a New Jersey home-owner. A salesman knocked at the door and announced that he was from a new company in New York.

"We'd like to do business in this area with a new aluminum siding," said the salesman. "And we've selected your house as a model. We'll give you a whole new siding job free if you'll let us take pictures of your house and use it for advertising purposes."

Free! Who can resist such a deal? This home-owner signed up promptly and got his job done just as promptly—plus a bill for $1,960! He's now paying off that note at the rate of $67.93 a month because what he didn't know when the salesman shoved a batch of papers under his nose to sign was that one of them was a bank loan authorizing the new siding job.

Another angle to the "model home" trap turned up a few months ago in Memphis, Tenn. A gyp outfit there convinced dozens of home-owners in a single community that their homes had been carefully selected for a package "model" deal. [*Continued on page* 166]

STICK to your guns. If you have any doubt at all about the caller at your door, you can't lose by saying, "No, thanks!" And it might save the family bankroll.



CADDY WAGON looks like McCahill's Dream Car. (Insert: drawing from Dec. '51, MI.)

$10,000 STATION WAGONS

Even if you have the cash you'll have to line up for a Cadillac station wagon.

By George Laycock

CADILLAC has never gone into the station wagon field in Detroit. But down in Cincinnati the craftsmen at Hess and Eisenhardt, a famous old custom body building shop, had long dreamed of making Cadillac station wagons.

In recent years a growing number of

STATELY DESIGN traditional with Cadillac has been carefully preserved in the station wagon.

Cadillac dealers had been encouraging Bill Hess in this extravagant notion. The idea appealed to Hess, a General Motors Institute of Technology grad, who is generally considered one of the most advanced stylists in the industry.

So he turned his talents to the station wagon challenge. The design, of course, had to meet the approval of top Cadillac men in Detroit if the finished car was to be marketed as a Cadillac. For nearly a year he worked closely with Cadillac and carried sketches back and forth to Detroit until both sides were satisfied. Then some months ago the first of the new station wagons rolled from the Hess and Eisenhardt plant—seven of them, each one different in color and finishing from the others but all with the same long, sleek and powerful appearance, standing only two inches higher than the passenger car. All the pillars are chrome plated. Exterior trim is Fiberglas. There are full wrap-around windows in the rear.

This station wagon has a 129-inch wheelbase. It can be ordered with power brakes, power steering, Hydramatic transmission, electrically-operated windows and automatic radio antenna. The dash is padded and the windshield tinted if you prefer. Total cost: $10,000 and up.

When the builders shipped two of them recently to Cleveland on an auto transport truck, the back station wagon stuck out over the trailer's lower deck about four feet. The driver inched his truck across the state at a crawling pace and gave every passing car maximum clearance. "By the end of the trip," he said, "I was a nervous wreck. I'm not used to hauling $20,000 worth of car in one load." •

HIGH STANDARDS of workmanship won Detroit approval of Hess and Eisenhardt.

DESIGN CONFERENCES with his engineers plus those with Detroit brass kept Bill Hess busy.

EXTERIOR TRIM of the Cadillac wagon is Fiberglas; pillars are massively chrome plated.

FARM HOBBIES THAT PAY OFF

MODEL GAME FARM run by industrialist John Olin uses farm rig for carrying guests to

IF YOU have a farm, or a little piece of land you call a farm, the chances are that you aren't cashing in on all of its by-products. Farming offers a profusion of profitable possibilities. Have you thought of mint raising? Musk-ox ranching? Turkey liver paste processing? With imaginative packaging you could probably sell anything on the place from cockleburrs to Japanese beetles.

If that sounds like city hick talk, sneering how easy farming is compared to straphanging and secretary-herding, consider the cases of some real dirt agriculturists who have turned sissy sidelines and summer folks' follies into real money. There's the Maryland man with $10,000 worth of cage birds on his ten-acre place—canaries, parakeets, and so forth. He started with a pair of pet birds. A York Stater named Perry Slocum put three water lily plants in an old cauldron some years ago; now his full-color catalog sells plants and pool goldfish to buyers from Alaska to Panama.

Maybe your part of the country won't support that kind of profitable boondoggling, but every region has specialties that sell like hotcakes. Or like pure maple syrup *for* hotcakes; George Taylor of Stamford, N. Y., puts out his own line of maple products—syrup, sugar and candy—to a list of customers that reads like Who's Who. Marvel Carter Campbell, who lives on a farm in the old Moravian country in North Carolina, does a nationwide trade in Moravian Christmas Cookies. Another Tarheel farm in Statesville processes, packages and sells fancy pickles called Dixie Dames. Home-baked bread for sentimental palates has turned Alice

You can turn your farm sideline into additional income or your Number One paying crop. **By Irv. Leiberman**

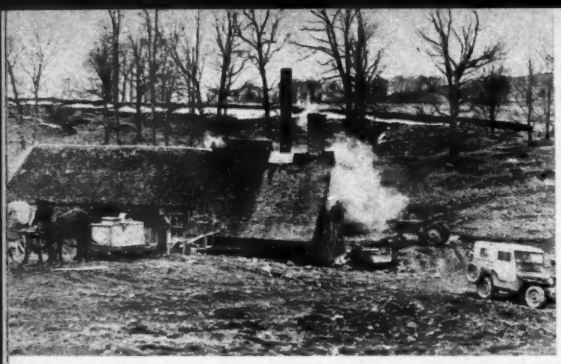
hunting grounds to shoot released birds over cultivated fields. Farmers can make it pay.

Rudkin's Pepperidge Farm loaves into a factory industry; all her delicious bread is still made from stone-ground flour from an old Connecticut mill—a whopping selling point for thousands of supermarket shoppers.

Local ham from many locales keeps mouths drooling and cash registers chiming. There's apple-chip smoked ham from Pennsylvania, pepper and molasses-cured ham from North Carolina, corn-fed, sugar-cured, hickory-smoked ham from Iowa. Around Smithfield, Va., tourists buy hams fed on peanuts and just enough corn to harden that oily fat into something that makes ham fanciers feel like jes' settin' and having a nice cry. All pig—but processed and packaged to sell to the luxury trade.

Although many farmers make special kinds of sausage, there isn't enough pro-

FISH FARMING can pay well, too. Fish and Wildlife Service will assist you.



MAPLE SUGAR is a luxury crop and a sure seller. Pictures show sugar house and maple cream mixer on the Taylor Farm, New York State.

duced yet to satisfy the demands of folks who remember, or think they do, grandma's wonderful breakfasts around hog slaughtering time. Memory Foods —that's the angle—and that's what Harry and Emma Clark call their line of country sausage, Virginia water-ground corn meal, black buckwheat flour and New Orleans molasses. The Clarks are Virginians who have transplanted themselves and their Old South goodies to a Yankee farm in New York. After wrapping themselves around some of the Clark's eatables people from Manitoba think they're hearing plantation songs.

Everybody knows food comes from farms. But how about money from earthworm raising, mantis egging, skunk de-skunking? All being done right now by level-headed capitalists in blue jeans. One successful worm ranch belongs to Dr. T. J. Barrett of the San Fernando Valley. Twenty years ago he dumped a load of worms into a barren piece of sandy ground; soon afterward his little desert was green with luxuriant vegetation. The little topsoil makers were on the job. Then Dr. Barrett began collecting worm eggs and selling them to envious farmers. Today he supervises two earthworm farms, sells cultures of 500 worms at $10 a culture and can't keep up with his orders. Collecting praying mantis egg clusters is a profitable hobby for a New York State man who sells them to folks who want bug-eating mantids in their gardens. Raising descented pet skunks hardly rates as a novelty any more; people are buying the skunklets as a proven product these days.

When a hobby begins to pay off big it begins to look just like more farming —hard work for a living. But the point about farm sidelines is that they don't have to support you—they need only supplement farm income. There's room for such activities on most farms. And country living leaves time for hobbies that pay—running coon hounds, for instance. This [*Continued on page* 166]

REAL BREAD from Pepperidge Farm, Conn., is made from tasty stone-ground flour from an old water-driven country grist mill.

500 Miles on a Tank of Water

CHARLES KEEN'S unique steam streamliner gets 25 miles on a gallon of water. Keen, a 55-year-old Madison, Wis., manufacturer, spent 13 years and over $100,000 developing and building his car. While the old Stanley took from 20 to 30 minutes to warm up, Keen's high-pressure boiler and flash-type burner can get up 1,000 lbs. of pressure in just 35 seconds. And the boiler can't blow due to the limited amount of steam contained in it at any one time. Boiler and burner are under the hood and the steam alternately powers the car's two-cylinder rear engine. You just step on the accelerator to go and press the brake to stop. Keen's "Steamliner" is almost soundless. •

CLUTCHLESS car has no exhaust, doesn't make noise. Above, steam sediment blows.

WATER supplies steam and at 1,000 lbs. pressure, engine puts out about 200 horsepower.

HAND-BUILT steam boiler generates so much power Keen is afraid to open up on the road.

WORLD'S WACKIEST INVENTIONS

"Nonsensical" describes this inventor's nutty devices but they'll guarantee a chuckle.

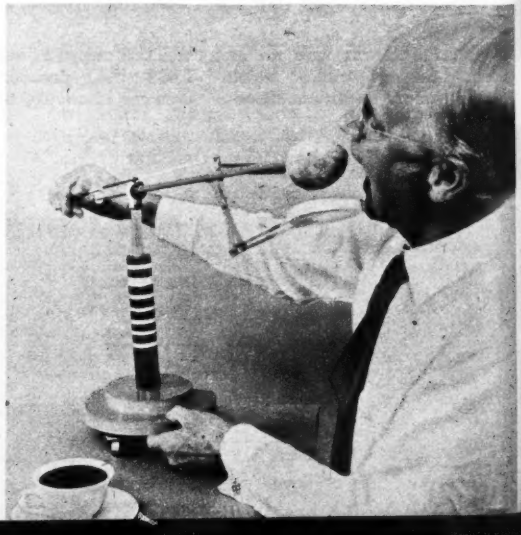
RUSSELL Oakes' knack for dreaming up wacky inventions can be charged to his desire to simplify the complexities of modern life. Though his nonsensical creations may be more involved than the problems they're designed to solve, you're guaranteed a chuckle using them. Oakes has contrived such devices as a cocktail glass with a movable bottom that enables you to get at the cherry without straining your tongue; a device for knocking flies off a sandwich while balancing a cup of coffee, and a fan that operates via jaw-motion for speakers in hot climates.

Nutty devices—but fun. •

Automatic tip requester for bashful bellhops registers no sale when cheapskate patron tries to palm off inadequate fee.

This machine lights cigarette when water is put in funnel. Don't ask how it works.

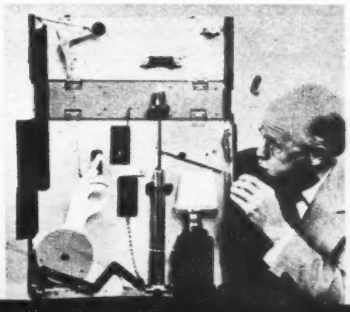
Doughnut dunker prevents wet, sticky fingers. Pan under sinker catches drippings.



Oakes and jaw-motion fan, fly-shooer, spaghetti-winder, spikes to weave through crowds.

Sleeve protector for exposed butter dish is aid for guys with boardinghouse reach.

Intricate workings of gadget that shuts light after you fall into dreamland is shown here.



Ear trumpets for eavesdropping can be turned in any direction to overhear all juicy gossip.

AMAZING
MARVELS
OF TOMORROW

FLYING SAUCERS FOR EVERYBODY!

Within ten years you may be commuting by plastic saucer, flying from your backyard.

By Frank Tinsley

SAUCER rises vertically, flies conventionally.

IT IS a bright morning in 1965. At precisely eight a. m. Joe Lees emerges from the back door of his lakeside cottage, only 75 miles from his job in the city. In the graveled center of his backyard his jaunty new plastic saucer rests lightly on three tiny balloon tires.

Greeting his neighbor who rides with him, Joe lifts a flush flap in the saucer's rounded nose. He turns a recessed locking handle and throws back the bubble-like windshield. Spring loaded, like the hoods of today's cars, the enclosure lifts easily. As it does, the interlinked nose cone swings down to form a handy step.

Joe's neighbor steps up over the low instrument pedestal and then across the folded pilot's seat to his perch in the rear. Joe follows, slams the windshield shut and

FRANK TINSLEY '56

turns the starter key. The two men fasten their safety belts as the engine comes to life.

As the fan-like inductor begins whirling with a high-pitched whine, the automatic servo-flaps pop open and a torrent of air is drawn inward over the circular wings. Faster and faster it flows, building up the lift pattern of a racing, fixed-wing take-off. For a moment, the trembling saucer remains stationary. Then, slowly and smoothly, it rises vertically into the air like an elevator ascending an unseen shaft.

At 450 feet per minute, the saucer climbs to the southbound traffic lane and the engine's pulsing torque is shifted to the pusher propeller at the machine's tail. As the prop takes hold, the inductor fan gradually slows to a halt and the servo-flaps clamp shut. Functioning now as a fixed-wing airplane, our saucer banks around and heads south at a comfortable 165 mph cruising speed.

As it tools toward the city, other saucers join the parade and there is a thick stream of aerial traffic. Soon, the downtown towers of the metropolis loom on the horizon and a whole complex of distant traffic lanes converge from the four corners of suburbia. Over the business district, Joe turns out of the main stream and heads for the company's building. He throttles back his prop, shifts to the air inductor again and slowly descends to the landing pad. It is now 8:30 a.m. The 75-mile flight took only 30 minutes.

MI's saucer was conceived by Peter Nofi, an officer in the Merchant Marine. Nofi, a dedicated student of aerodynamics, has combined the downward jet thrust of the ducted-fan with the proven principle of the high-lift air-foil. We know that the fan will work because using it, men and machines have been lifted bodily into the air by the modest power of outboard engines.

Nofi's arrangement is inherently simple. He has merely taken the straight airplane wing and pulled the ends around to form a circle with the leading edge facing out. In the center hole of this doughnut-shaped airfoil, he has mounted a ducted-fan which sucks a high-speed airflow in over the wing and, in the form of a compressed air jet, blows it out through the bottom of the hole.

According to Nofi, the negative (upward) pressure created by the passage of air over the top of the wing, plus the reaction (upward) pressure of the air jet, add up to a total lift ample for vertical flight.

The other unique feature of Nofi's saucer is the pair of semi-circular servo-flaps hinged to the top of the wing root on either side of the fuselage. These open automatically to permit inward airflow when the ducted fan is operating, then close to form the top curve of a large fore-and-aft airfoil when the machine is in forward flight as a fixed-wing airplane.

A twin control system is employed to provide for the differing conditions of vertical and forward flight. For vertical take-off and landing, compressed air from the inductor is piped to the aileron and flipper areas and expelled through differentially operated jet nozzles. These are built into the conventional control surfaces used in forward flight and are operated by the same wheel column.

In line with his low cost philosophy, Nofi plans to have the top and bottom surfaces of his saucer stamped out on a press, using a plastic material reinforced by glass "flock." This technique, now successfully employed by small boat builders, will also be used on the servo-flaps, fuselage and other components. Cemented together with the internal gas tank spar, plumbing, etc., in place, the hollow wing will then be filled with a foamed plastic compound which cures into a rigid, air-filled sponge. This replaces expensive interior structure and converts the wing into an unsinkable life-ring for emergency water landings.

Mass produced, the plastic saucer should cost no more than today's medium-priced cars. Could be that by 1965 you'll have one flying out of your backyard, too! •

SIMPLICITY of Peter Nofi's unusual, low-cost saucer is shown in the diagram at right.

DOWNWA
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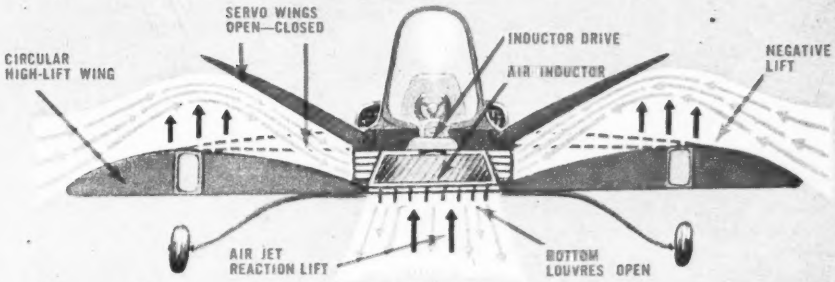
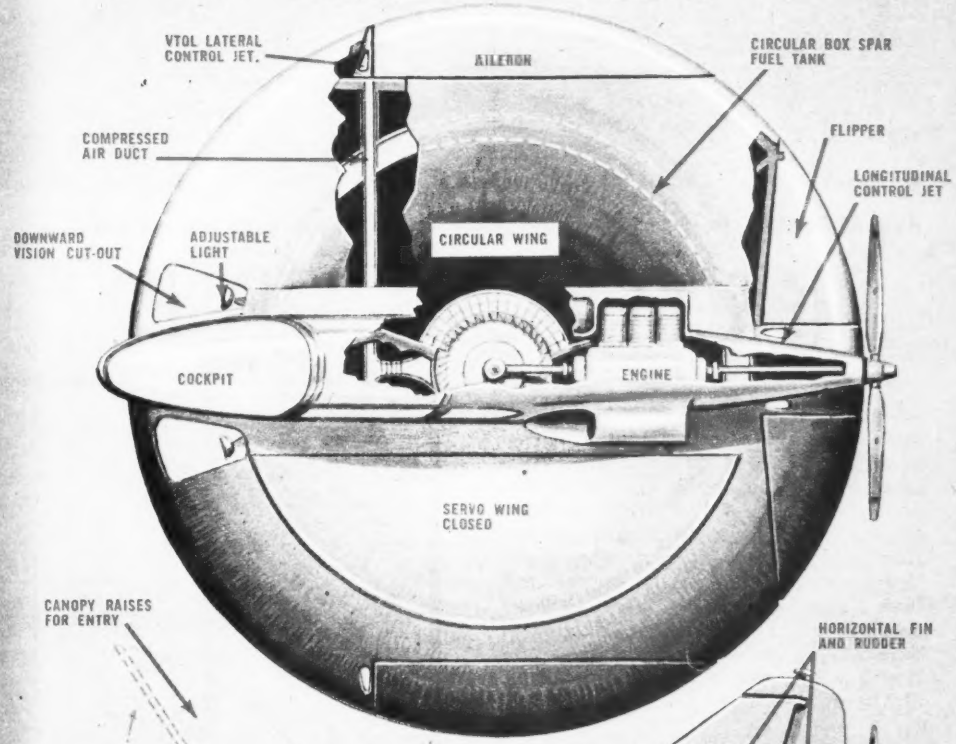
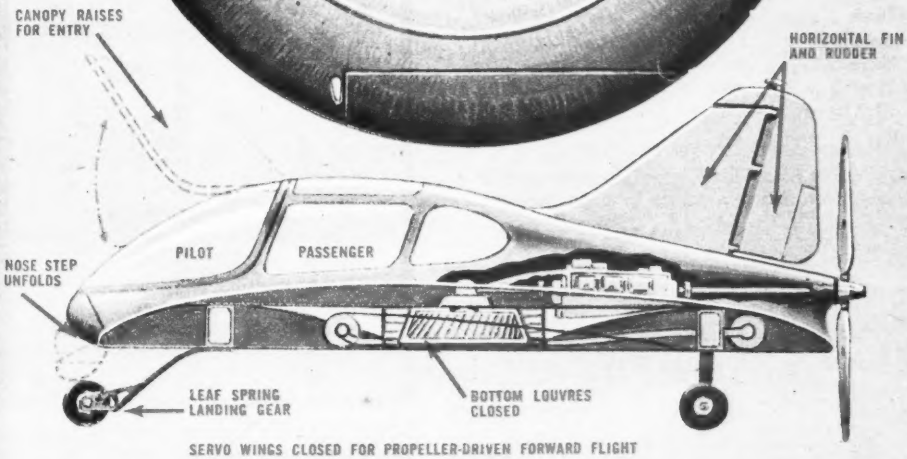
AIRFLOW PATTERN FOR VERTICAL TAKE OFF AND LANDING

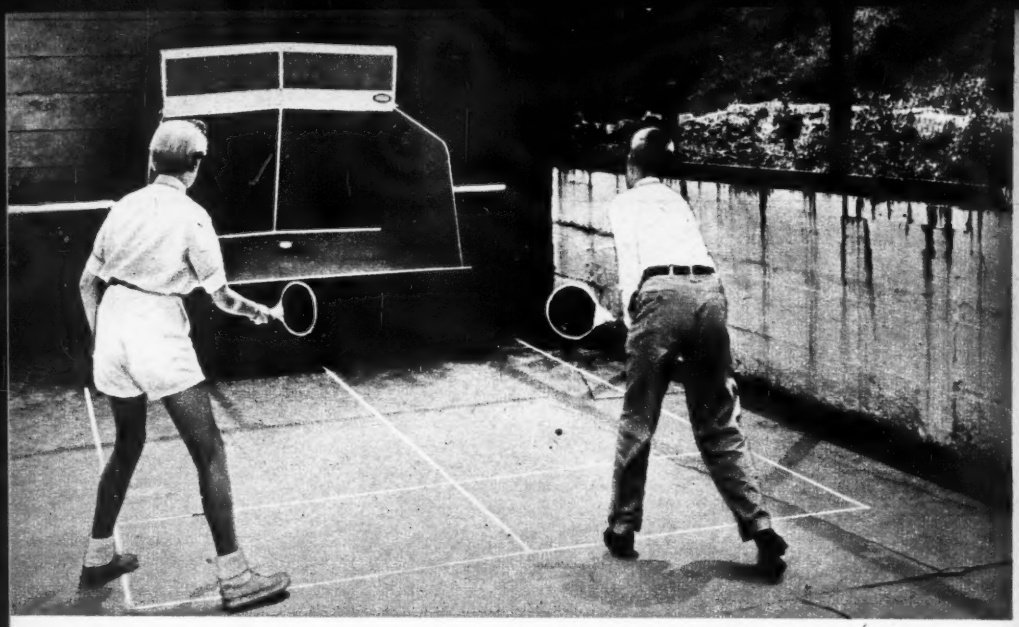






SERVO WINGS CLOSED FOR PROPELLER-DRIVEN FORWARD FLIGHT

FRANK TINSLEY '56

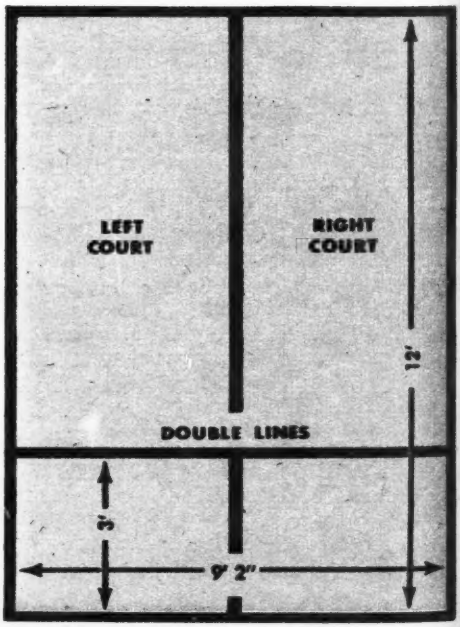


AVID SMASHERS play intensely, shifting positions warily in anticipation of angled returns.

NEWEST GAME—"SMASH"

SMASH! Into the sturdy, collapsible plywood backstop goes the tough little polyethylene ball. How it returns is anybody's guess until you've learned how to play the angles against an opponent's weaknesses. Big thing about this new paddle game is that it's fun from the beginning, can develop great skill and condition in the player and uses a space only 9 by 12 feet in your garage, cellar, porch or driveway. Schools, Y's and youth clubs are using it and Aussie tennis stars showed it off at Olympic Village, Melbourne. •

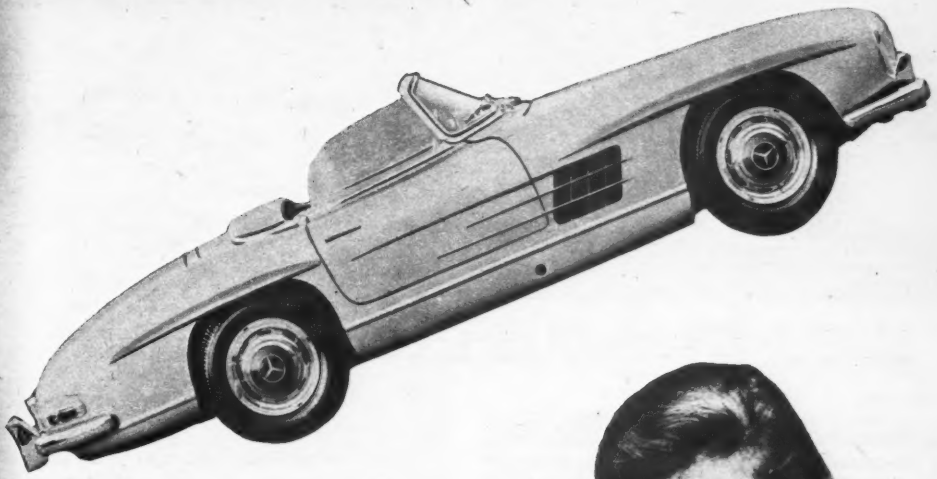
INDOOR SMASHERS play in corner of gym where backstop is set up in a few minutes.



COURT LAYOUT shown here is used for both singles and doubles "Smash" matches.

IT'S NEW!

POSTHOLE digger demonstrated by Secretary of Agriculture Ezra Taft Benson (in white shirt) is electric powered. Auger is fitted to one-half inch, heavy-duty drill, sinks a four-ft. hole. Thor Research Center developed it.



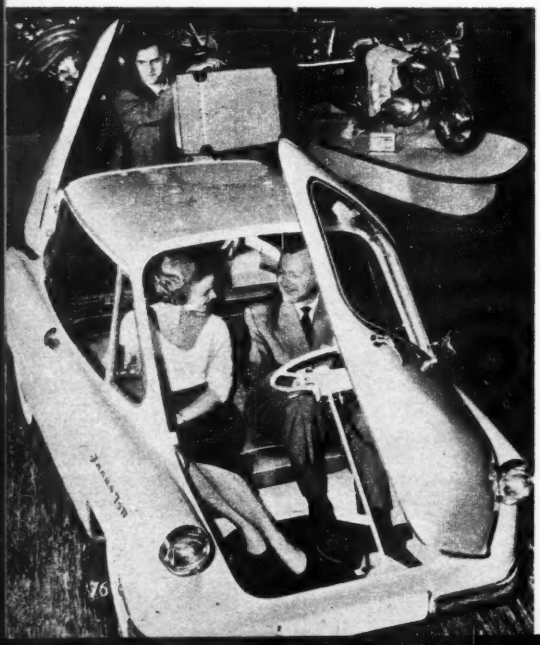
ROADSTER version of Mercedes-Benz 300 SL is planned by famous auto maker for spring. Sleek car will retain all refinements of current production jobs and will also be equipped with 6-cylinder, fuel-injection engine.

DO IT YOURSELF! Take your own blood pressure. One well-known doctor thinks that many persons with this ailment can examine themselves with ease. The device is made by the Lifeguard Research Corp., Phila., Pa.

CONTINUED . . .

JET-STYLED model liner designed by German Dieter Jansen is powered by six miniature diesel engines. Ship can be radar guided and is said to travel 60 mph on calm water.

MIDGET German car seats four people back-to-back. It has front, rear door, does an estimated 50 mph, will sell for about $760.



MICRO-THIN plastic rain cape can be folded to fit in cigarette-size package, even when wet. Mighty handy for rainy gallivanters.

SCOOTER CANNON combines scooting with shooting. French gun is a short-barreled, 75mm recoilless job. It carries six ammo shells in place of saddle bags.

FUN JEEP, above, intended for beach use, touring, camping; seats seven. Farina-built, it features gas-stretching 4-cylinder mill.

LIGHTNING on wheels, below, is gleaming Alfa Romeo sports car reputed to do 170 mph. Stabilizing ailerons are Plexiglas.

PLASTIC relief globe was sculptured to scale in 12-in. and 72-in. diameters for use in libraries, schools, by Geo-Physical Maps, Inc., New York, N. Y.

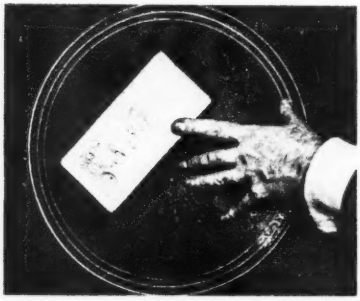
HOPPER on German railroad car automatically lifts itself to five ft. above understructure, tilts slowly to unloading side and empties its contents into truck.

CELLAR FULL OF GOLD

Only Fort Knox has more bullion than the vault under 33 Liberty Street.

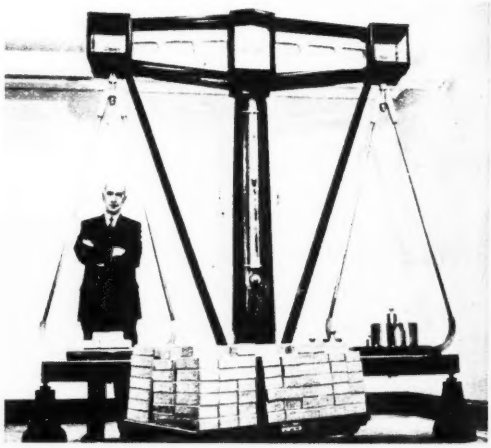
Gold bricks are Ivory Soap pure (99 per cent plus), so soft they must be handled very gently.

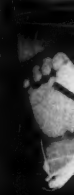
Like Renaissance palaces after which it was designed, 33 Liberty Street is a real fortress. Below: each brick bears a fineness indication.



THE TALE of the yardbird who kept moving a pile of bricks back and forth endlessly is acted out with international significance in the solid rock cellar of the Second District Federal Reserve Bank in New York, where six and a half tons of gold worth $8,000,000,000 are kept to back up currencies of 60 foreign countries and the International Bank. In this man-made mine, stackers have to move the stuff brick by brick from one triple-locked cell to another as one nation's balance drops, another's goes up. •

Each brick weighs 27 lbs., is valued at $14,000.





HAUN
Harry
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SPOOK STALKER Philip Paul laces doorway with thread to test solidity of strange visitors to the house.

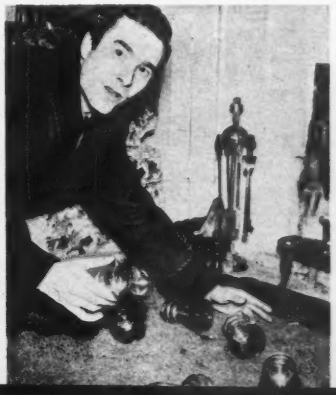
HE HUNTS GHOSTS

ONE of every 14 Britons claims to have seen or heard a ghost, according to Philip Paul, vice-chairman of the Ghost Club of London. Investigating specters, sleeping in haunted houses and reporting to the 150 members of the century-old Ghost Club are Paul's hobbies. (Ghost Club members also dabble in hypnotism and firewalking.) Pictures show Paul checking up on a haunted dwelling and dressmaker's shop in London where a poltergeist (noisy ghost) had been rumpling beds, heaving flatirons and glasses and scaring the help. Sorry, no photos of the spook. •

MOVE OVER! Paul sleeps in an allegedly haunted bed.

HAUNTED HOUSEOWNER Harry Cox helps collect evidence on activities of ghost.

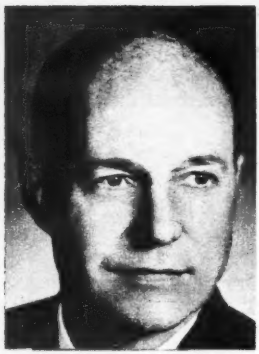
POLTERGEISTS? Non-believer Cox shows how ghosts, or something, left set of glasses.



CHIMNEY CHECKING—not for Santa but for draft that might explain strange happenings.

YOUR CAREER IN C

Few jobs offer as much opportunity to

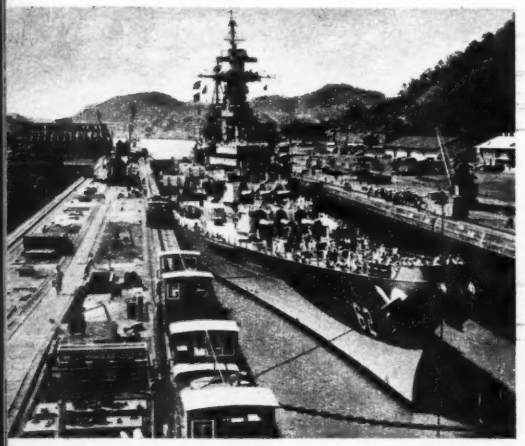


By William H. Wisely,
Executive Secretary,
American Society of
Civil Engineers,
as told to Lester David

IF YOU have ever dreamed of becoming a civil engineer, there has never been a better time to translate that dream into reality.

Right now, for example, the nation is embarked on a mammoth 41,000-mile Federal highway building program, the largest construction job ever undertaken by the nation.

This vast roads job, and other projects needed by our bustling country, spell unparalleled opportunity for civil engineers and their technical aides in the years to come. Following an intensive survey on the manpower situation the Engineering News-Record, an authoritative journal, stated that "Demand (for civil engineers) will certainly

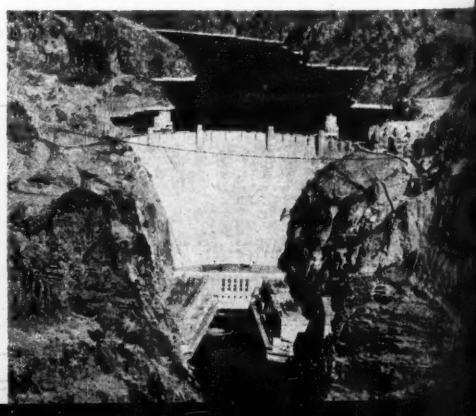


PANAMA CANAL, linking two oceans, is one of Seven Wonders of Civil Engineering.

SAN FRANCISCO-OAKLAND BAY BRIDGE: outstanding example of over-water structure.

COLORADO RIVER AQUEDUCT, longest man-made conduit, waters So. California.

HOOVER DAM is world's highest at 726 ft., almost as tall as the Woolworth Building.



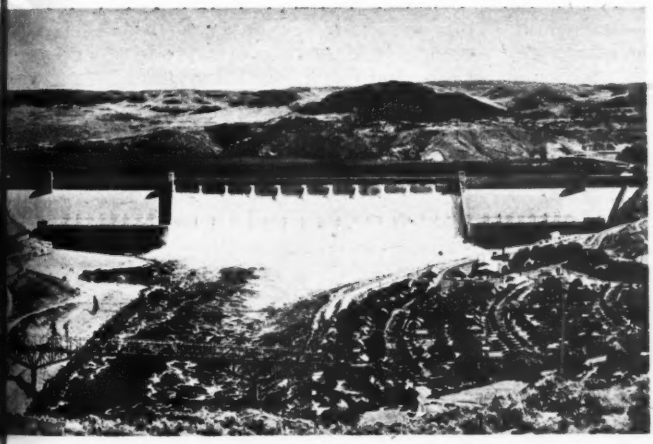
CIVIL ENGINEERING

improve the health and welfare of mankind.

increase. Highway activity alone will do it. And highway activity will breed other types of engineering and construction in need of manpower."

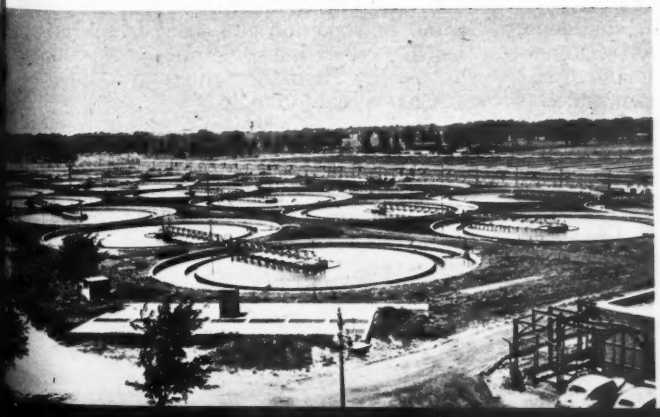
The Associated General Contractors of America reported after a recent study that the member firms will require 20,000 more civil engineers by 1960. That's just private outfits—demands for personnel of professional calibre are expected to increase by leaps and bounds from the many public agencies in the country.

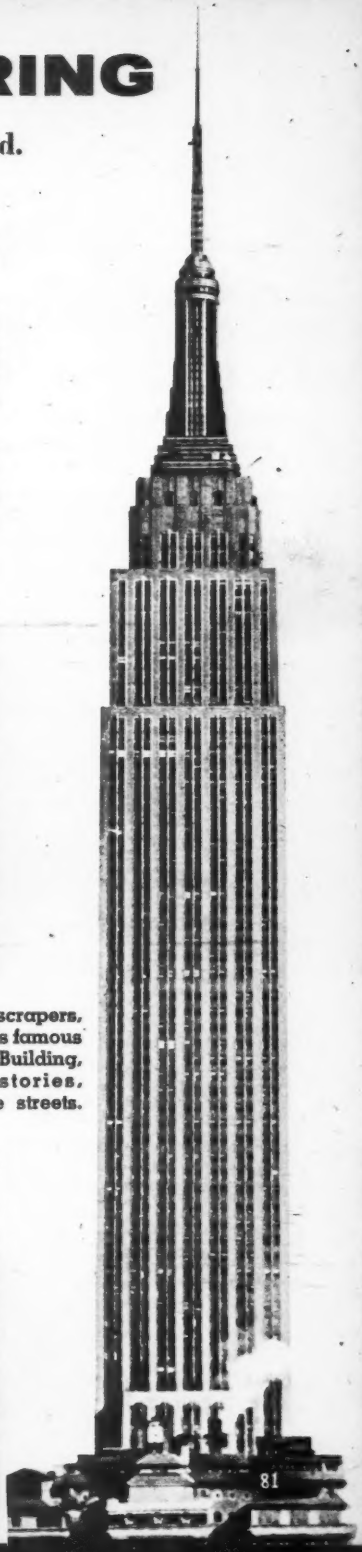
The number of graduates sent into the field by our universities won't be nearly enough. Thus you can conclude that the future is unquestionably bright and shining for a young civil engineer these days. And for



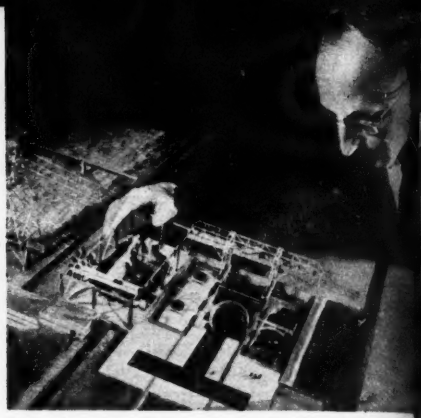
GRAND COULEE DAM and Columbia Basin Project: 500 million dollar irrigation marvel.

CHICAGO'S SEWAGE DISPOSAL SYSTEM: a herculean task in the realm of sanitation.





QUEEN of skyscrapers, New York City's famous Empire State Building, towers 102 stories, 1,472 ft. above streets.



MODERN civil engineer's work ranges from taming wilderness for super highway to DESIGN and construction of atomic energy plants for coming use in the United States.

the engineering technician as well.

But what is the CE like, really? What does he do, where does he do it, what does he get out of it—and would it all appeal to you? Let me introduce you to him. . .

Water now comes into your home at a twist of the wrist. But behind the faucet is an extensive water supply system conceived, designed, constructed and operated by CE's.

Modern sewerage systems and incinerators dispose of waste safely and swiftly. These systems were created by CE's.

In fact, every large stationary structure you see and use (and many you don't see because they are underground) was designed and built by CE's.

Civil engineers built modern wonders like the Empire State Building; the Colorado River Aqueduct, world's largest man-made conduit; the Grand Coulee Dam and Columbia Basin Project; Hoover Dam; the Panama Canal; the San Francisco-Oakland Bay Bridge; the gargantuan Chicago sewage disposal system. Each is a world's champion, and each is a job done by civil engineering. Does it fire your imagination? Want to be a part of the team which is creating other wonders to match these? Then let's get specific.

The modern CE is a specialist. Here are the more important branches:

Surveying and mapping engineers carry out property surveys, prepare contour maps for construction projects, and map very large areas and even entire countries.

Highway engineers plan and build our vast network of roads with their bridges, tunnels, culverts, grade separations, and traffic control systems.

Transportation engineers locate, build and maintain roadbeds, bridges, freight switching yards, roundhouses, freight and passenger stations and other structures for railroads. They build airports with their runways, control towers, terminal buildings and hangars.

Structural engineers design and supervise the construction of apartment houses, public buildings, locks and dams, tanks, towers, subways, industrial plants, bridges, wharves, docks, stadiums.

Sanitary and public health engineers provide safe water supply for cities and scientific waste disposal systems.

Hydraulic engineers build dams, canals, harbors and thousands of miles of pipeline for petroleum products and natural gas.

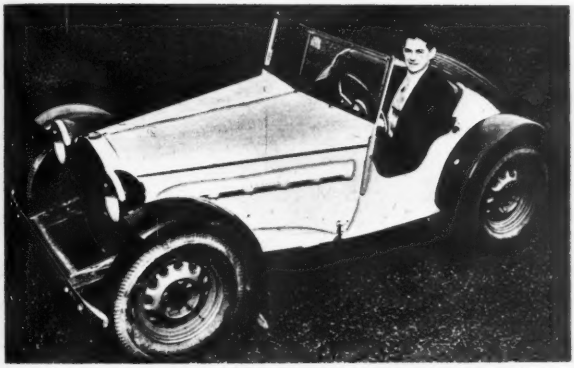
Foundation engineers devise means of supporting structures on the earth at the construction site. Solid rock is the No. 1 choice but sometimes you can't find rock. Then the foundation engineer has a real job to do.

City planning engineers lay out our towns and cities with street systems, residential and business areas, parks, shopping centers and parking sites.

What's the life of a CE like? Many jobs are in the large cities where a fellow can [*Continued on page* 173]

Eye Stoppers

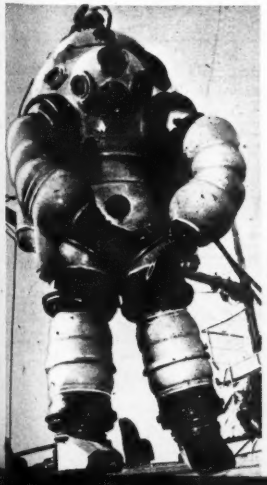
EYES ICE Cutter studies big $2,500,000 rock in New York shop of jeweler Harry Winston.



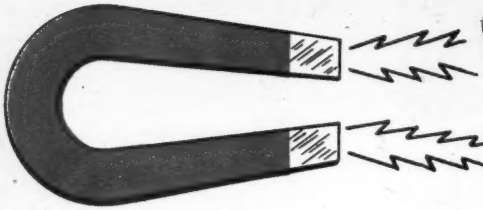
HEAP'S CHEAP Florida man's 85-hp homebuilt cost $200 for motor, parts.

TAPES SHAPE Petite brunette, 12 inches tall, displays truly trim and chic hip measurement.

CREEPS DEEP In new suit Italian diver can go down to a record 820—foot depth.



WEARS WARES: London vendor sells his plants from novel pick-a-back planter-carrier.



CURIOUS MATTER OF ATTRACTION

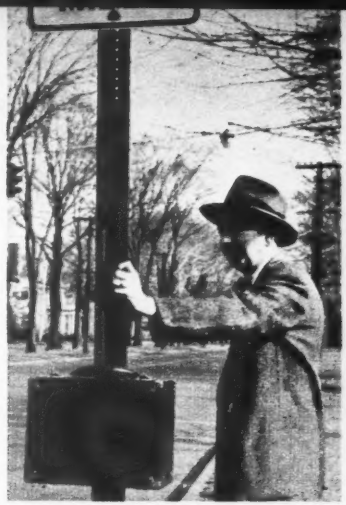
Gal hanging by her skates on one of Eriez's most powerful magnets had to be helped down by unlacing shoes. Skates were taken off later.

Useful in industry and the home, magnets are also very good for picking up people.

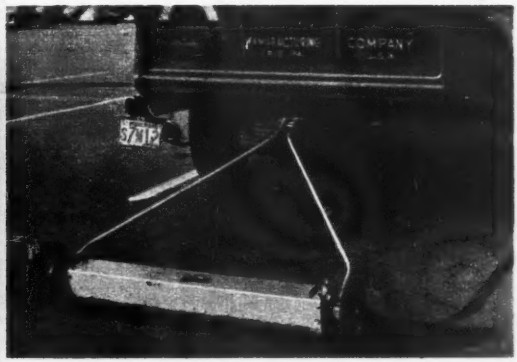
Quick pass with a magnet and all the hairpins come leaping out in a hurry.

Snatching tin cans from high shelves in the kitchen is a lead pipe cinch.

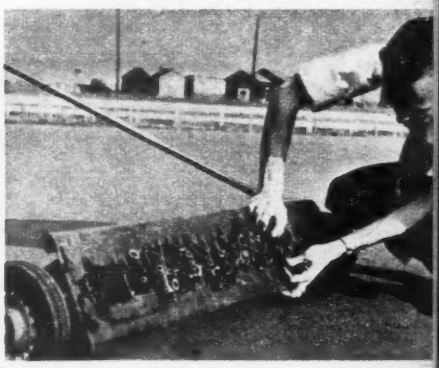
PICKING up pins with toy magnets is kid stuff to the Eriez Company of Erie, Pa. Designers of magnets for industry, Eriez attractors can pick up people—if they're attached to something magnetized. Industrial magnets have other uses, too. Housewives, for example, use them to pluck tin cans from high shelves. Rolling varieties will pick up anything made of metal. The beauty of these magnets is that they won't lose more than one per cent of their strength in a century of pulling—a real attraction. •



Handy and impressive trick for magnet salesmen.



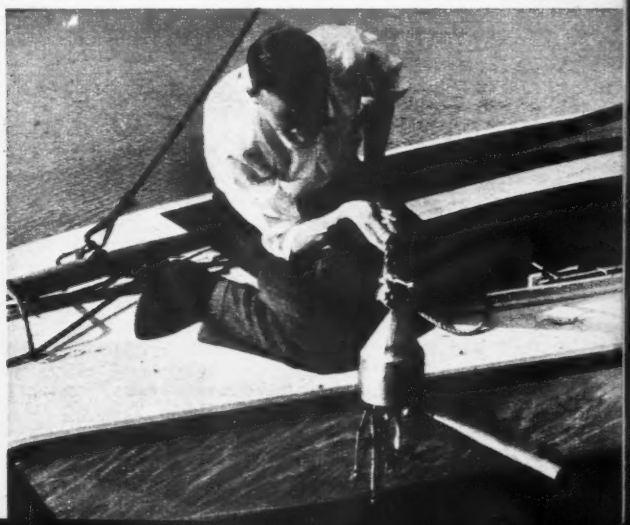
Picking up stray nails, metal on runways, etc., is easy with a rolling-type magnet.



Now there's only one little problem. How the devil do you get the darn stuff off?

Office paper-clip droppers who don't like to bend down will like this little gadget.

Police often use powerful magnets to get knives and guns thrown to river bottoms.



MCCAHILL TESTS

THE RAMBLER

The '57 model sports a brand-new V8 mill that develops 190 hp.

By Tom McCahill

EIGHT years ago when Nash Motors announced that it was going to build a 100-inch-wheelbase automobile, one of the smallest cars ever planned by a major American motor-maker, speculation was anything but rife in the industry. The Battleship School of Design Boys felt that the announcement from Kenosha, Wis., was just another Nash publicity gimmick, not much different from the well-planned hullabaloo which had accompanied an earlier pint-sized offering called the N.X.I., an experimental roadster which had graced the covers of many national magazines, garnished several million dollars' worth of free publicity for Nash Motors,

EASY HANDLING and big trade-in value are two plus features reported by Uncle T.

EXPERT TRUNK-TESTER Jim McMichael shows enthusiasm at Rambler's roominess.

LIGHT STEERING, even without power, and improved turning radius mark '57 rig.

but never actually got into production.

However, the Nash Rambler, as it was called, was far from being just a publicity gimmick. I was the first person not on the company payroll who ever drove one of the little cars and my test article about it hit the newsstands (May 1950 MI) just a few days after the first production model was shown to the public. This Rambler, which the smart boys in the industry had figured would never be built, turned out to be the fair-haired kid who grew up to support its elders, the more conventional Nash and Hudson of what is now American Motors.

I took a Rambler all over Europe in 1953, crossing the Alps twice. I couldn't have selected a better car for the trip then—and I couldn't now. It was just the size you needed to cope with European roads and it averaged 27 miles to a gallon in an area where gasoline cost anywhere from 65 to 90 cents a gallon. This early Rambler had just two faults: you needed Idlewild Airport to make a U-turn; and acceleration was so mediocre that when the light turned green you mailed a letter to the engine room.

Nash licked the turning problem in '56. For '57 they've got the get-away equation nicely balanced with a brand new V8 engine. I remember running an informal race in my '53 Rambler against two European jobs and feeling very proud that I could keep them in sight for 200 miles. With today's V8 engine

I could have towed all three cars faster than we were going then.

Nash Motors realized that you couldn't beat Chevrolet, Ford or Plymouth to one per cent of their market by aping them. Their offerings had to be different from any other cars made in this country—and they had to be different in the right way. For years the reclining bed-seat introduced by Nash offered comfort you couldn't find in a Cadillac or a Lincoln, much less Nash's price competitors, and the little Rambler today still has many features the other three can't even start to buck.

Let's get right to the most important feature every independent maker would like to have: the resale or trade-in value. In this department the Rambler —and the Rambler alone—can match any of the Big Three and quite often beat them.

With Number One Item tucked away, let's consider what else it has. It has fully-reclining seats, a master anti-fatigue feature for two people on a long trip. It has a glove compartment in which, besides gloves, you can stow hip boots, three mah-jongg sets and a stuffed owl. Some of the competition cars sport bigger ashtrays than glove compartments. To the city driver this may not mean much but to the cross-country motorist a decent storage bin is a big feature.

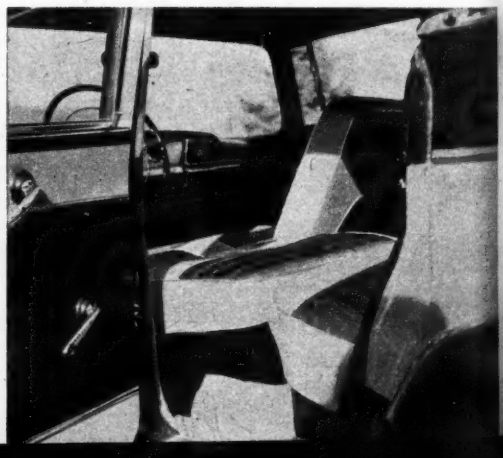
The interior fittings, including the upholstery, seem lusher than those in the production record holders. Don't forget that Rambler was one of the first cars, if not *the* first, to feature air-conditioning as a production item. Its heating and ventilating system has been the tops in the country for years. Tie this up with the fact that the car is a neat-handling package due to its small exterior size, while sacrificing nothing from the interior, and you have quite an automobile.

Thousands of Ramblers have been sold on these features alone which were so appealing to so many drivers that they didn't mind the lukewarm performance, though they sometimes felt a *little* hurt when Mrs. Brown's boy Buster left them behind on his home-built scooter. Today the Rambler has gone All-American and sports a brand-new V8 engine as American as the tail-feathers on the eagle. In going to a V8 the Rambler crew had a lot of things to consider. Since its inception they'd been shouting "fantastic economy" and V8's of larger size naturally have a bigger thirst for petrol.

To beat the wear factor, the engine was oversquared in design; it only has a 3¼-in. stroke loping up and down inside a 3½-in. bore. This squaring, or oversquaring, cuts friction wear to a minimum, as the strength is gained through firing the charge over a larger base target area of the piston top instead of gathering the strength through a long stroke. The engine size of 250 cubic inches, tremendous by past Rambler standards, is still on the smallish side for domestic V8's. However, this little job develops 190 horsepower at

FRONT END has been redesigned. Outside lights on the fenders are turn-indicators.

RECLINING SEATS and twin beds are still featured in all of the '57 Rambler models.



4900 rpm and 240 foot pounds of torque at 2500 rpm and it does this with 8:1 compression ratio.

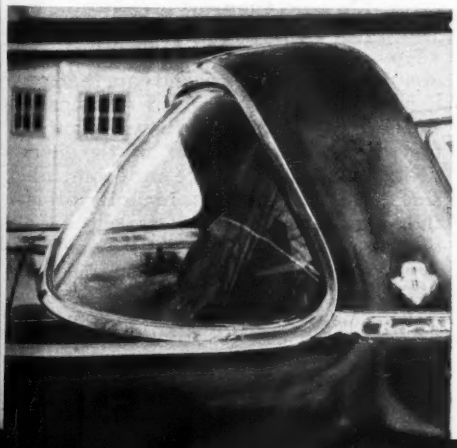
A few years ago when I was developing and building what might be termed hot rods, 8:1 compression ratio was considered hot stuff. Today it seems hardly more than a friendly handshake. Higher compression is an economy factor, too. With modern engines going as high as 10.5:1 the oil companies have had to up octane ratings in order to get the glazed balloons over the trolley tracks without sounding like the Anvil Chorus. Most of the poorest fuels sold today are better than the premium petrol of four years ago. With its 8:1 compression ratio, the owner of a Rambler can run it right up to the Regular pump and whiz away happy. Add this to the displacement size and you have the right combination for the most economical V8 car made today.

The Rambler engine may not be the hottest but it's still hot. It has a cam that lets it unravel. The moment you start her up you dig a nervous beat that's anxious for orders. If you have the engine sense of a sea cow you know that this little bucket is dying to flex its biceps. My test car was equipped with Dual-Range Hydramatic—still the best automatic transmission, by far. If you slip it into the first pew of the Drive range and shove your foot forward swiftly, you'll be laid back against the seat like water in a whirling bucket. Zero to 60 mph takes 10.5 seconds which doesn't break any records but is far superior to any Rambler performance of the past. Four seconds for 30 mph and 14.7 seconds for 70 mph won't cause you any embarrassment in digging out for the last parking space at the club. And 7.0 for 30-60 mph means you won't have too much trouble passing Mother Sills on her bicycle in a dash to the firehouse picnic.

Top speed is over 100 mph—another Rambler summit—but how much over I can't truthfully say as a radar trap was nesting right in the middle of my measured mile during my test runs. (That top-speed test is getting harder to make all the time and the cops are no help.) You'll get better reporting on a new model Rambler, not yet available at this writing. This one has Bendix fuel injection. It will run during Speed Weeks at Daytona Beach in February. Don't be surprised if this car makes quite a showing, especially in the standing-start mile. It can't compete against the regular production stock cars, as American Motors won't have enough built by then to qualify. We'll give you the full results later.

In summing up, over my bend-and-curve course this Rambler is a nice, easy-handling car, safe as an embalmed anaconda. [*Continued on page* 170]

V8 EMBLEM, centered over nameplate, is emblazoned on the car's rear "safety arch."



SPECIFICATIONS

MODEL TESTED:

1957 Rambler four-door Custom

ENGINE:

V8 cylinder, OHV; bore 3½ inches, stroke 3¼ inches; maximum torque 240 foot pounds @ 2500 rpm; brake horsepower 190 @ 4900 rpm; compression ratio 8.0 to 1

DIMENSIONS:

Wheelbase 108 inches; overall length 191⅛ inches; tread 57¾ inches front, 58 rear; width 71⅓ inches; height 58⅔ inches; weight 3,220 pounds; standard tire size 6.70x15; gas tank 20 gals

PERFORMANCE:

0 to 30 mph, 4.0 seconds
0 to 50 mph, 7.7 seconds
0 to 60 mph, 10.5 seconds
0 to 70 mph, 14.7 seconds
30 to 60 mph, 7.0 seconds
40 to 70 mph, 8.1 seconds

Top speed, 100 mph plus

SPEEDOMETER ERROR:

At 60 mph on speedometer, actual speed 56.4 mph

McCAHILL TESTS

THE FC-150 JEEP

"Great piece of equipment," reports Tom of this unique vehicle which says "Go!" when other cars say "No."

By Tom McCahill

A VULGAR vegetarian with a blue-water background named Popeye The Sailor was the proud possessor of the first Jeep. The Jeep of comic strip fame, a versatile beast named Alice, could do just about everything but play Rachmaninoff's Third Symphony on the bongo.

Not too long after Alice's debut at the Thimble Theater the American Army put in a hurry-up requisition for a small, compact, gasoline-powered vehicle capable of doing everything from climbing trees to whistling Dixie during rest periods. The vehicle that resulted was the Jeep, named after Popeye's old pet.

As the proud possessor of a late model Jeep I was only too glad when Editor Bill Parker said he thought a test on the new Forward Control FC-150 might prove interesting. Incidentally, if the term "Forward Control" is confusing to you it just proves that you haven't been keeping up with things and don't know about all those long-hooded cars that are driven from the back seat. Basically the new job has the same power plant as my regular Jeep and also has the short 81-inch wheelbase. Here most comparison stops. The engine is mounted aft of the forward seats and you can check the oil and water level without leaving the driver's seat.

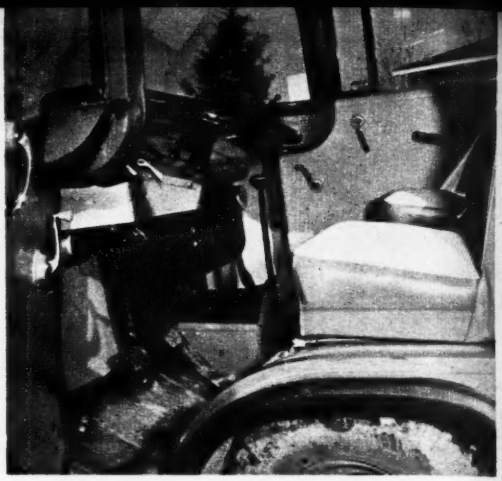
Though I hate to admit it, this is a much more versatile number than my

RUGGED JEEP is equally at home fording a stream, climbing a mountain or bucking mud.

hunting Jeep. It has a carrying capacity that makes my Jeep seem like a Grand Prix race car. The new one will go anywhere the regular Jeep will go and the visibility is far superior. You're sitting way up there like a Greyhound bus driver and there's nothing in front but straight down. It'll carry as much as the average large-size pickup truck and comes in a much handier package, being 147 inches overall with an extreme width of 71 inches. It's as easy to park as shooting $20 at Belmont. Tie all this up with the fact that you have a four-wheel drive at your command and it turns out to be quite a rig. The four-wheel drive, which I first tested up a mountainside during a rain squall, has all the sure-footedness of a telephone lineman going up a pole.

It takes a little doing to get used to the front wheels being right under your bonanza. Once, when I hit an extremely large, solid bump, my backbone snapped like a buggy whip and my ear base spread a full inch. The steering ratio

DRIVER can check the Jeep's oil and water level without leaving his perch in the cab.



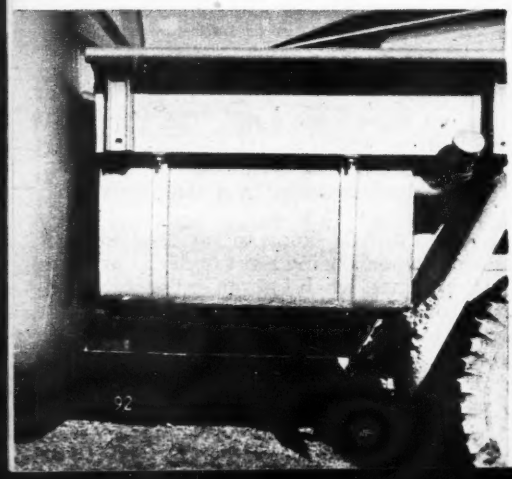
ROOMY CAB has only driver and passenger seats, horizontal, bus-type steering wheel.

is 32.1, or about equal to the Queen Mary's. That means that you can wind the thing up like a malt mixer before you make the slightest directional change. Though I haven't spoken to company engineers about it, I imagine this high ratio was to keep the customers coming—or I should say *able* to come. If this job had the fast steering of a sports car you'd spend much of your driving time on your head. As it is, the ratio is not bad at all once you get the hang of it. Anything quicker with that under-seat location of the front wheels might prove dangerous.

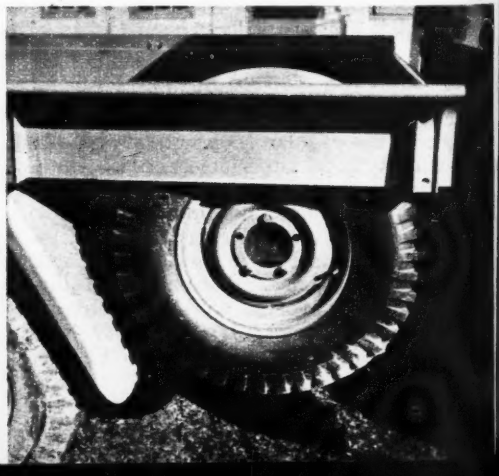
While I'm pecking away at Mr. Willy's Little Willie, let's get all my beefs about this rig on the table at once so that we can get on with the goodies. To start with, it has only a driver's and a passenger's seat, both of which are as uncomfortable as the pads in the regular Jeep. Oh, they may be one coil spring softer but they are many miles from lush. This is a fault I've kicked about in Jeep products for many years. Competitive pickup trucks give you upholstered seats that have all the comfort of the average passenger car. Not so with this offering. As some of you old-time readers may remember, I installed bucket sports car seats in my own Jeep. This made the car completely civilized.

More beefs—the noise level in the cab

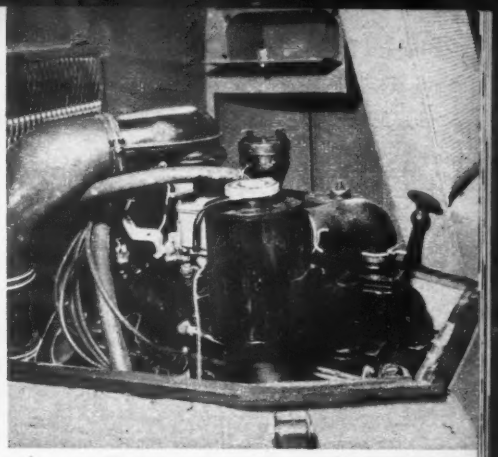
GAS TANK with 16-gallon capacity is slung behind cabin and in front of rear fender.



SPARE TIRE is nestled in the same spot as the gas tank but on the co-pilot's side.



RIDING HIGH. Tom found he could see "right over roofs of all the other cars on road."



MITEY 75 horsepower mill can power saws, welding equipment, generators, water pump.

is on the high side at speeds about 50 mph and the heater, which I tested when the temperature was nine above, didn't get hot enough to loosen a restaurant-sized pat of butter. The bumper, although sturdy as a Merritt & Chapman barge compared with today's Detroit products, doesn't look rugged enough to push down trees of forearm size, as my Jeep has done hundreds of times when clearing trails. The fourth (and last) beef is the high step into the cab. It makes mounting a feat equal to getting onto Trigger. Some of the gals, and even some of the shorter men, may have to pole-vault into this job.

Now for the bouquet department. The transfer case for getting from two-to-four-to-two-wheel drive again has been much simplified, using only one shift lever as against two in my Jeep (plus the regular lever). One night when I had this rig out in extremely heavy traffic, there was a miserable ground fog lying about five feet off the ground. This had all the regular passenger cars creeping. From my high perch (and the top height of this [*Continued on page* 170]

AIR INTAKE for engine, mounted aft of forward seats, is located under rear window.

SPECIFICATIONS

MODEL TESTED:

1957 Willys FC-150 Jeep

ENGINE:

4 cylinder, F-head; bore 3⅛ inches, stroke 4⅜ inches; maximum torque 115 foot pounds @ 2000 rpm; brake horsepower 75 @ 4000 rpm; compression ratio 6.9 to 1

DIMENSIONS:

Wheelbase 81 inches; overall length 147½ inches; tread 48¼ inches front, 48¼ rear; width 71⅜ inches; height 77¾ inches; weight 2,925 pounds; standard tire size 7.00x15; gas tank 16 gals

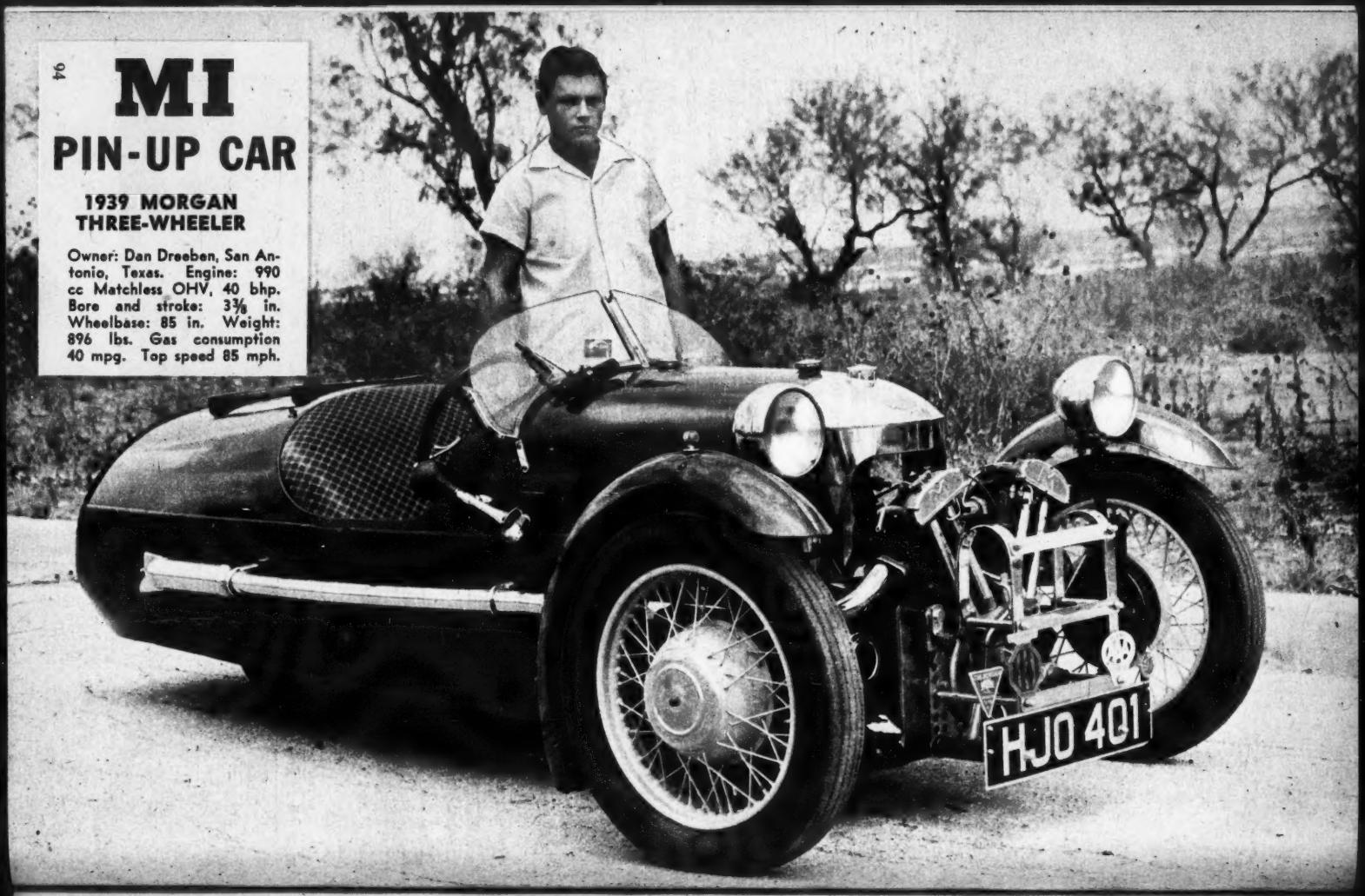
PERFORMANCE:

0 to 50 mph, 15.3 seconds

MI PIN-UP CAR

1939 MORGAN THREE-WHEELER

Owner: Dan Dreeben, San Antonio, Texas. Engine: 990 cc Matchless OHV, 40 bhp. Bore and stroke: 3⅜ in. Wheelbase: 85 in. Weight: 896 lbs. Gas consumption 40 mpg. Top speed 85 mph.

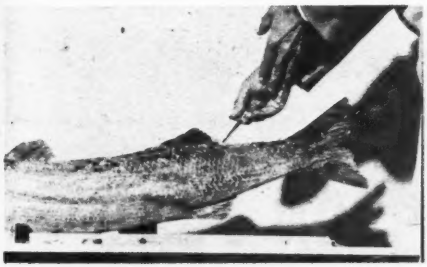


DON'T STUFF 'EM–

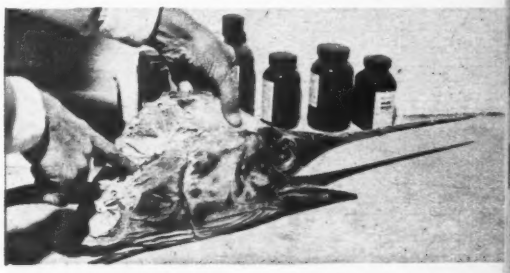
PETRIFY 'EM!

That's exactly what Julium Kovack does with his amazing new formula.

AFTER ten years of painstaking research Florida jewelry-maker Julium Kovack appears to have stumbled upon a method for preserving fish and game by means of three simple chemical injections that petrify the specimen. The 45-year-old Hungarian's experiments promise an inexpensive method for mounting trophies in the future without first removing muscle tissue and organs. Kovack's injections are composed of more than 17 chemicals and the solution must be injected into the specimen before it begins to spoil. •



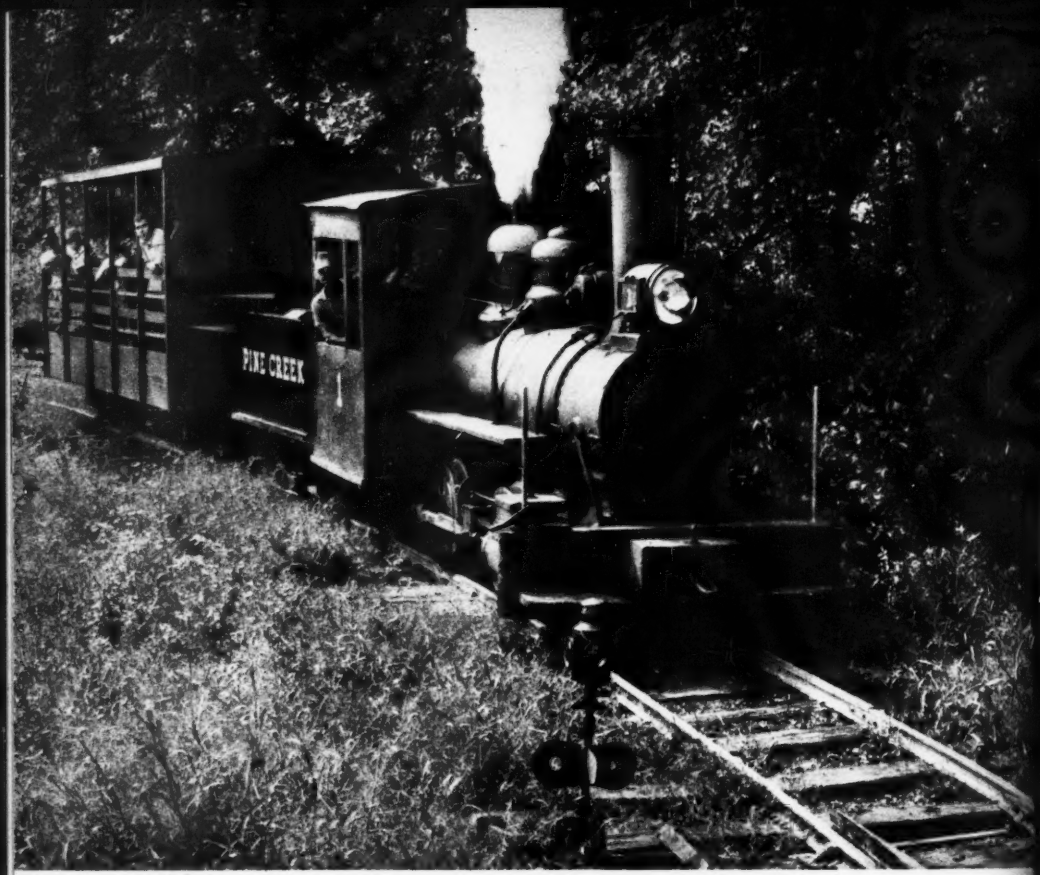
Two injections are given at outset, third shot three days later completes process.



Three weeks after last shot all odor has disappeared and petrification is complete.

After three days insides of fish or animal have hardened to cement-like consistency.

Kovack's experiments with petrification of flowers led him to startling discovery.



Belching steam, old Number 1 comes chugging around the bend hauling load of passengers.

RIDING THE IRON PONY

Pine Creek is run for fun by avid Freehold, N. J. hobbyists. You can take a ride for only 20 cents.

PINE CREEK Railroad runs only on weekends but you can take a ride on its 1800-foot right-of-way for only 20 cents if you happen to be in the vicinity of Freehold, N. J. There you will find a little iron pony trailed by its tender and hauling passengers in an open air caboose. A hand car completes the rolling stock.

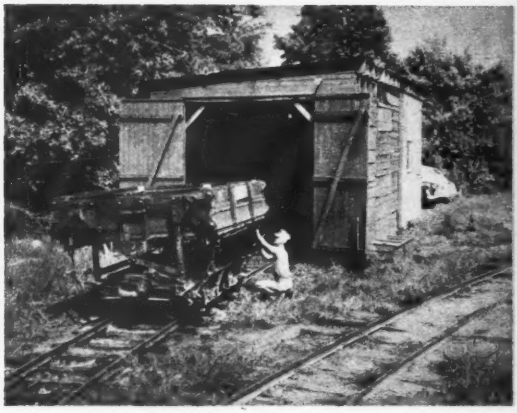
The little trains were first used back in the 1870's and operate on narrow-gauge track only three feet wide.

Pine Creek is run for fun by a group of avid hobbyists. During the winter the engine rests in the roundhouse but comes the warm weather and the enthusiasts have one-track minds. The week-end railroaders hope to expand the line and attract more fans and visitors to the unique Pine Creek run. •

Engineer Harry Quick fires her up while manager Jay Wulfson takes over throttle.

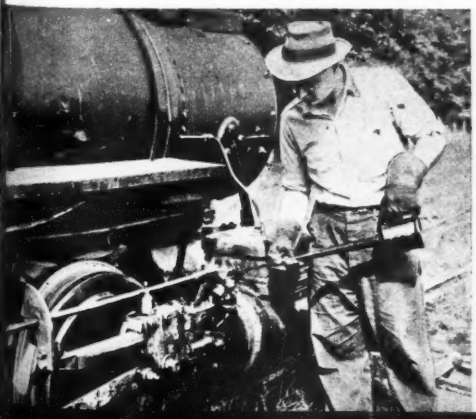
Quick uses sump to pipe water to engine. His regular job is driving a fuel truck.

Hobbyists do all work on three acres they own, hope to buy adjacent land in future.



Pine Creek's square roundhouse. Dump car was acquired for conversion into caboose.

Master mechanic Pete Rasmussen oils drivers. He's agent for Central Railroad, N. J.



Pine Creek personnel line up on the 1925 Baldwin locomotive they bought for $400.

Their Ship Came in . . . from Tokyo

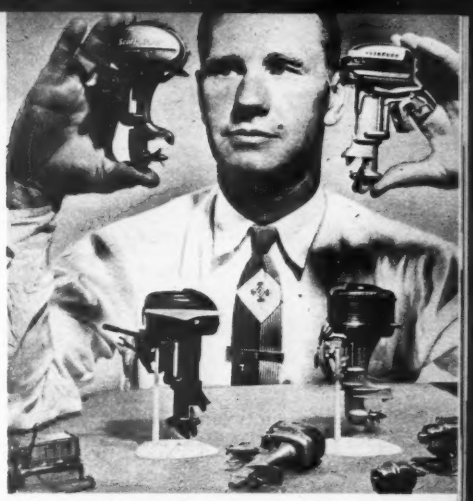
MONEY MAKING IDEA

Clair Oberly and Les McDonough, two ex-fliers, parlayed their model boats into a million-dollar-a-year business.

By Louis Hochman

SLEEK and well-designed, the low-cost, electrically-operated K & O toy speedboats took country by storm.

TOKYO end of operation where boat decks are made is supervised by Clair Oberly.



AUTHENTIC working miniatures of brand name outboards shown by Les McDonough.

SEVEN years ago, Clair Oberly and Les McDonough were just another pair of ex-Army and Navy fliers earning their keep as pilot and navigator for the Flying Tiger Line, a commercial outfit operating between the United States and Tokyo.

They didn't even know each other until they were both assigned to the same flight one day. But this chance meeting developed into a fast friendship and a model boat business that began with a modest $100 investment. Today the model boats—the Fleet Line and K & O Boats, electrically operated toy speedboats of modern design—provide work for more than 1,000 employees and an annual million dollar gross income for the two ex-fliers.

Clair had been running a retail toy store in Wisconsin as a sideline at the time of the meeting. Since they were Tokyo-bound, Clair decided to investigate the toy market in that city.

In Tokyo, the fliers visited various toy manufacturers and picked up an assortment of items—a screw set, boat kit, cheap outboard motor and some accessories.

When they returned to California they contacted some jobbers in the Los Angeles area. The toys, said the jobbers, were practically worthless. Almost nothing was plated, the metal parts would corrode easily, the wood wasn't properly cured, the screw sets wouldn't fit domestic motors, etc.

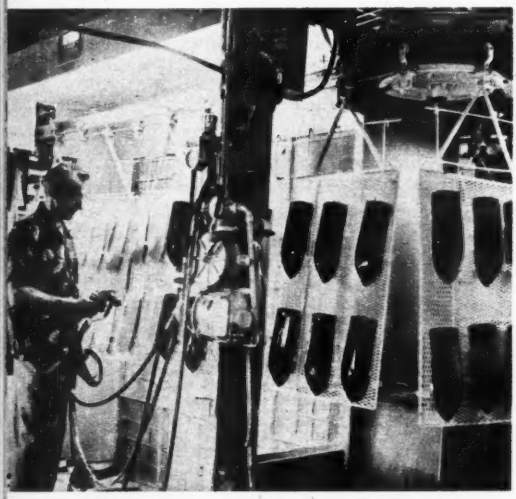
Les and Clair pointed out these flaws to the Japanese on subsequent flights, an invaluable service since the Japanese couldn't afford to keep a man Stateside. As a result, after about their fourth trip to Tokyo and an outlay of $50 each, they began getting a warmer reception from the Los Angeles jobbers.

They kept their jobs with the Flying Tiger Line for three years, pouring the profits into letters of credit with Japanese manufacturers and bringing in freight loads of constantly improved goods which sold at phenomenally low prices. The airline cooperated by allowing them to stagger their flight schedules so that one could work the local end in the States while the other handled the manufacturing end in Tokyo.

The first big break came when Clair decided to put out a boat kit with a motor in it. He designed the No. 101 Speedster kit, the first complete model boat kit ever put on the market. It contained everything the model boat builder needed—motor, hardware, fittings, deck, hull, etc., and sold for only $11.95. The 101 Speedster kit was made in Japan in 1952 and 51,000 were sold in the States. It was this kit that really put the K & O Models Company on the map.

They have since put out another complete kit with motor for $4.95 and ready-make craft with motors for as low as $2.29.

PLASTIC hulls made in U. S. are fitted with Tokyo-made decks at the plant in Van Nuys.



CONVEYOR belt moves hulls past the paint-spraying unit to infra-red drying oven.

SPECIAL small air hammer is used to assemble the boats with drive screws in U. S.

Things rolled along smoothly until one serious problem came up. The wooden boat hulls being made in Japan were not too good because of improper curing of the wood. So in 1953, Les and Clair made a bold move. They decided to set up their own plant in the United States and manufacture the boats, using the Japanese-made decks, fittings and motors with U. S.-made plastic hulls. They took a leave of absence from their flying jobs and leased a plant in Van Nuys, Calif.

The new company took a severe body blow when the first 10,000 boats they turned out proved to be worthless. Parts didn't fit, tolerances were off and drive screws started to pop. The novice businessmen had to discard every one of them and $65,000 went into the drink.

After this near-fatal mishap Clair took off for Tokyo with a staff of assistants to supervise plant production there. Les took over operations on the home front.

Under Clair's supervision, the Japanese, who are capable of making excellent quality goods, produced merchandise with an unusually low defective rate—less than one-half of one per cent!

In the home plant, new methods to attach the wooden decks to the plastic hulls with drive screws were sought. Since the normal pressure used on these drive screws cracked the plastic, K & O, through the efforts of the Burklyn Company of Los Angeles, pioneered the development of a smaller, less powerful air hammer which does the job.

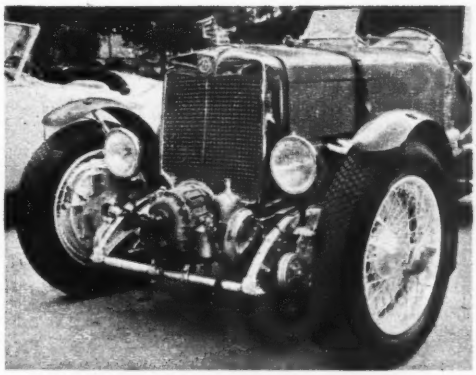
Painting problems were solved with a $20,000 conveyor belt spraying unit which automatically moves the boat hulls past spraying booths and through an infra-red drying oven.

The increase in production from these and other innovations was sensational. In 1954, 27 workers on the assembly line turned out only 350 to 400 boats a day. Today, 13 girls on the assemblv line can produce 750 to 900 boats a day.

Perhaps K & O's best break came when Clair conceived the idea of making authentic working miniatures of famous outboard motors. Les and Clair worked a full year with a Johnson motor, scaling it down until they perfected a tiny working [*Continued on page* 186]

Mr. Crown's Jewel

This handsome little '34 British MG has a top speed of 118 mph.

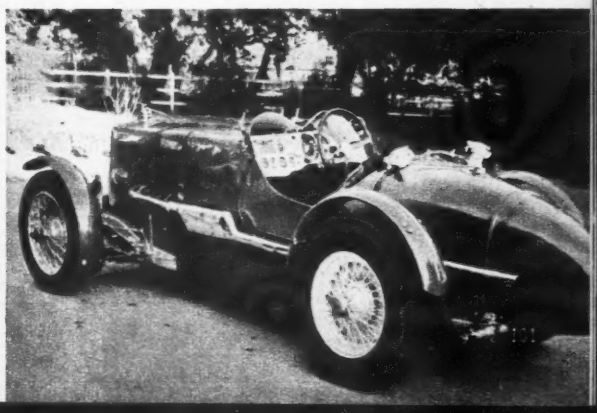


MR. H. R. CROWN'S MG Model K3 is literally a jewel. This fast and sleek British buggy, built in 1934, is equipped with a Marshall 85 supercharger. The six-cylinder overhead cam engine has a four-speed preselector gearbox and produces 120 brake horsepower at 6,500 rpm. Top speed is 118 mph. Mr. Crown, who lives in Burbank, Calif., uses it daily, weather permitting. •

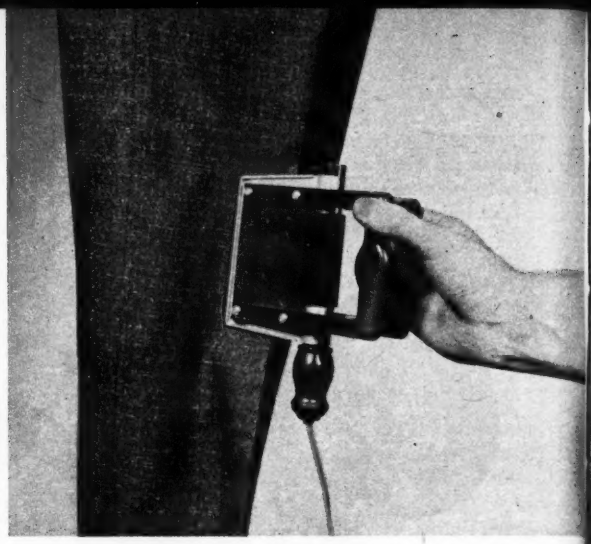
Marshall 85 supercharger in front of the grille gives the K3 power boost of 16 psi.

Small handwheel below preselector gear is for adjusting Electron fade-proof brakes.

Car is in original factory condition except for addition of doors, 16-inch wheels.



This Month's
BRIGHT IDEA



CREASE is made by moving presser one way only. $9.95 at Hoffritz For Cutlery, 331 Madison Ave., New York.

Electric Pants Presser

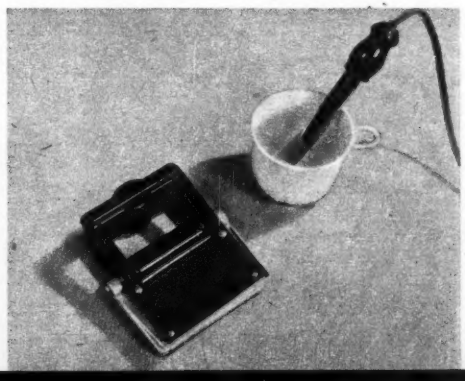
THIS nifty electric pants presser may be your cup of tea. The heating element can be removed and used as an immersion heater for boiling small quantities of water and drinks. A German import, the presser should enable the vacationer to stay neat and well pressed at all times. He plugs the unit into any wall socket and in three minutes places his tie or pants between the aluminum alloy heating plates, moving the presser in one direction only to get a sharp crease. The heating unit is of highly polished nickel with heat resistant bakelite handle attached to a 70-inch cord. It works on 110V AC/DC. •

WIN $50

MI will award $50 each month to the first person who tells us of a new and useful gadget that is patented and in production. Manufacturers are also eligible for this award. Pictures and a description should be sent to Bright Ideas Editor, Mechanix Illustrated, 67 West 44th Street, New York 36, N. Y.

HANDLES spread apart easily so that heating element can be taken out at tea time.

BOILING water with the heater after trousers are pressed takes about five minutes.



HE LABORS FOR ART

People Who Do Things

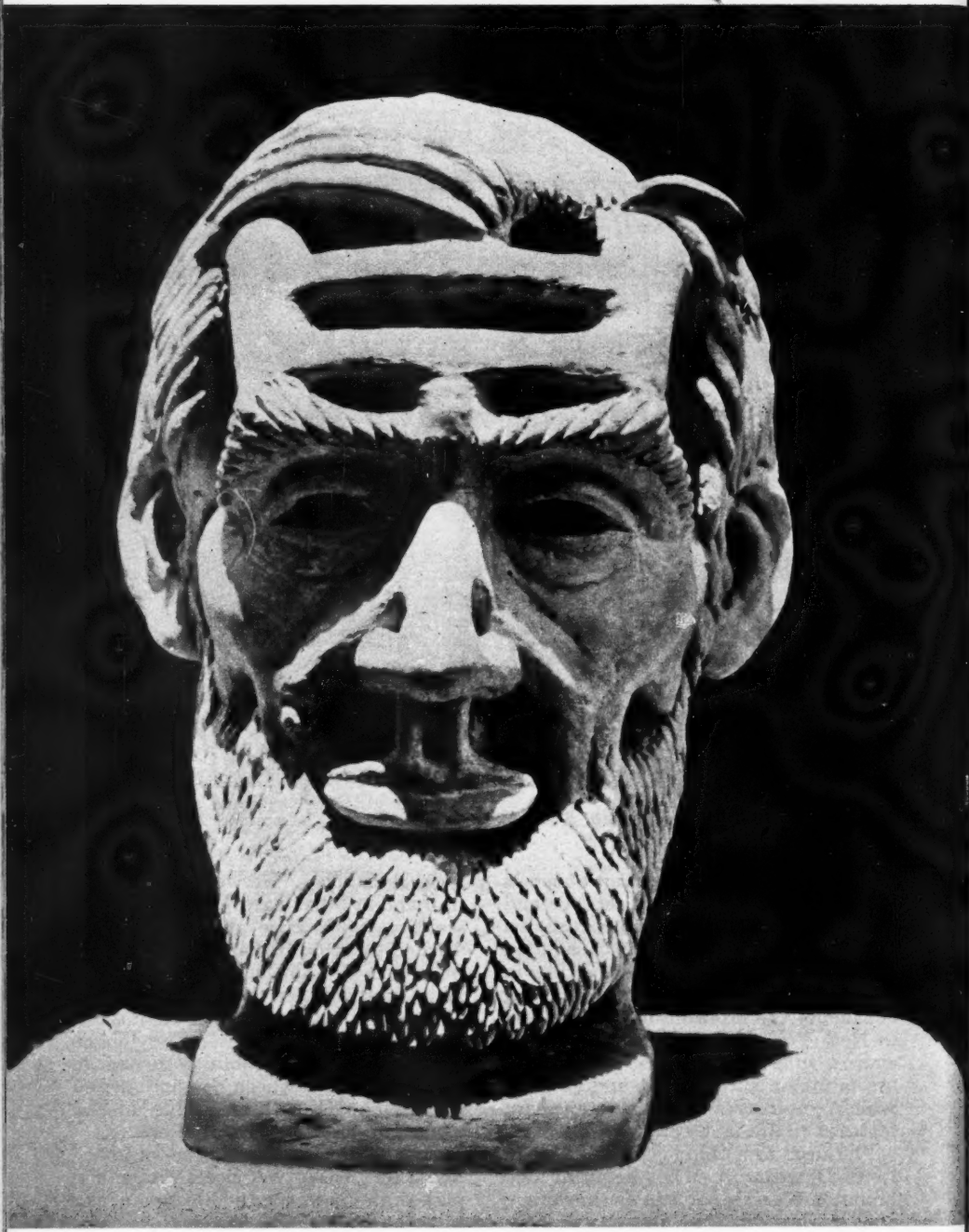
LABORER DLUGOSZ at work, left. A former garbage collector, he created figure at right.

THE confident-looking man above is Louis Dlugosz, manual laborer and sculptor of the remarkable busts shown on these pages. Dlugosz is considered one of the five truly creative artists in the world today by Monroe Wheeler, curator of the Museum of Modern Art in New York City. The sculptor specializes in a technique he calls "form assembly," a surprisingly lifelike style which emphasizes only the important features of the subject.

The urge to mold clay came early to Louis Dlugosz. As a boy he spent long hours on a creek bank in Lackawanna, N. Y., where he had found a particularly useful clay. He worked in a steel mill and at other hard jobs, meanwhile working with clay at night. Louis seemed to be on his way in 1940 when his work won him a one-man show in New York but then the war took a five-year bite out of his career. He met his wife Marcelle in Paris. They came back to the States but returned to Paris in 1950 where Louis studied under the GI Bill of Rights at the Academie La Grand Chaumiere.

There is a tangible evidence of Louis' talent for three of his pieces are on display in the permanent collection of the Museum of Modern Art in New York

Sculptor Louis Dlugosz's work has won him praise as one



GREAT EMANCIPATOR Abraham Lincoln as portrayed by the talented Louis Dlugosz.

of the five truly great creative artists in the world today.

SERENITY was captured by the artist in this highly unusual study he did of St. Patrick.

NOBILITY of St. Alphonsus Liguori is embodied in the form assembly Dlugosz practices.

STATELY bust of Confucius suggests the worldly wisdom expounded by philosopher.

City. His work has also been exhibited and won high praise in New York's Riverside Museum, Kansas City's Nelson Gallery and several other galleries. The Garret Club in Buffalo has shown some of his work, too.

Louis is employed by the Electro Refractories & Abrasive Corp. of Lackawanna. He, his wife and six-year-old son Michael live in a house crowded with his sculpture. His ambition is to make a living from his works of art or from teaching his unusual and eye-catching form assembly techniques to youngsters. In the meantime, Dlugosz labors for his art. •

LOUIS works at his art in the evening in house that is crowded with his creations.

SCULPTOR with his French wife Marcelle and their six-year-old pride and joy, Michael.

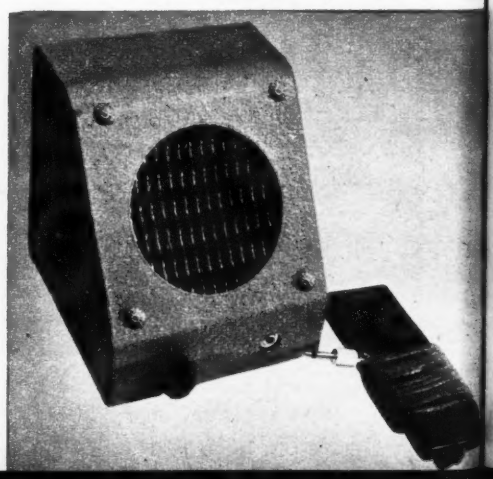
HOW TO TAP A PHONE

By Tony Karp

THERE are many ways to tap a phone; most of them against the law. Our little gadget, however, is quite legal and can be used to great advantage at home or in the office.

Basically, the unit consists of a pickup coil, an amplifier and a speaker. The pickup coil is placed under, or near, any transformer-type telephone without being in physical contact with it. As the electrical currents pass through the phone, part of the energy is induced into the pickup coil. This energy is fed into the amplifier where it is amplified to the point where it will operate the loudspeaker, enabling everyone within range to hear what is being said at the other end of the telephone line. This will come in handy when some relative

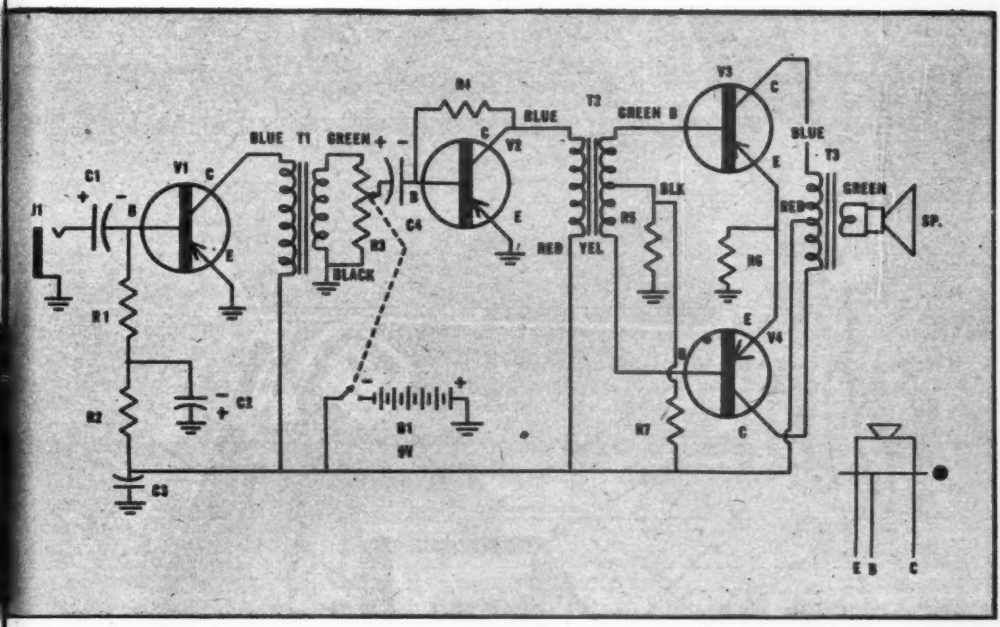
PICKUP COIL and complete assembled unit. The pickup coil's lead plugs into jack at right of the on-off volume control knob.



You can have lots of fun with this gadget which legally taps your own telephone.

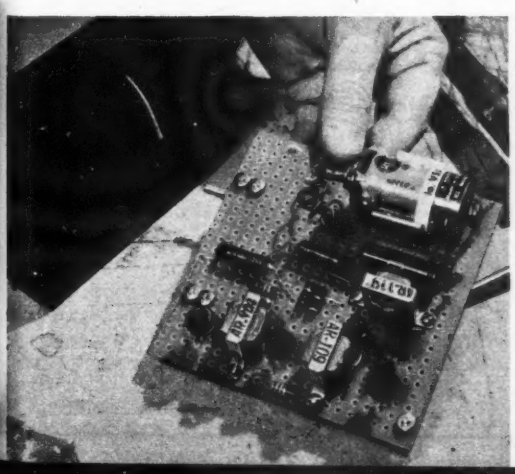
is calling long-distance; your whole family can hear what he is saying. Or, in the office, the whole staff can hear a salesman's report. There are other uses for the pickup, limited only by your own imagination.

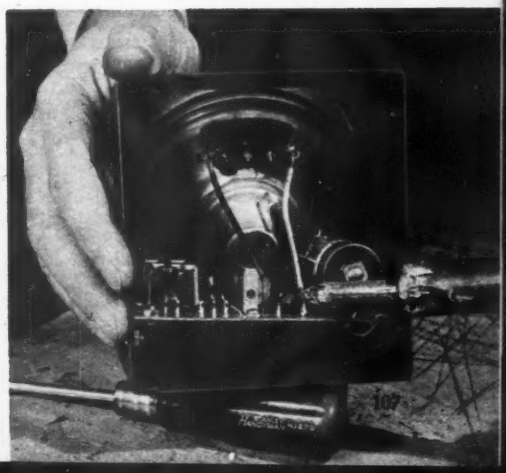
The unit is a four-transistor audio amplifier with three transformer-



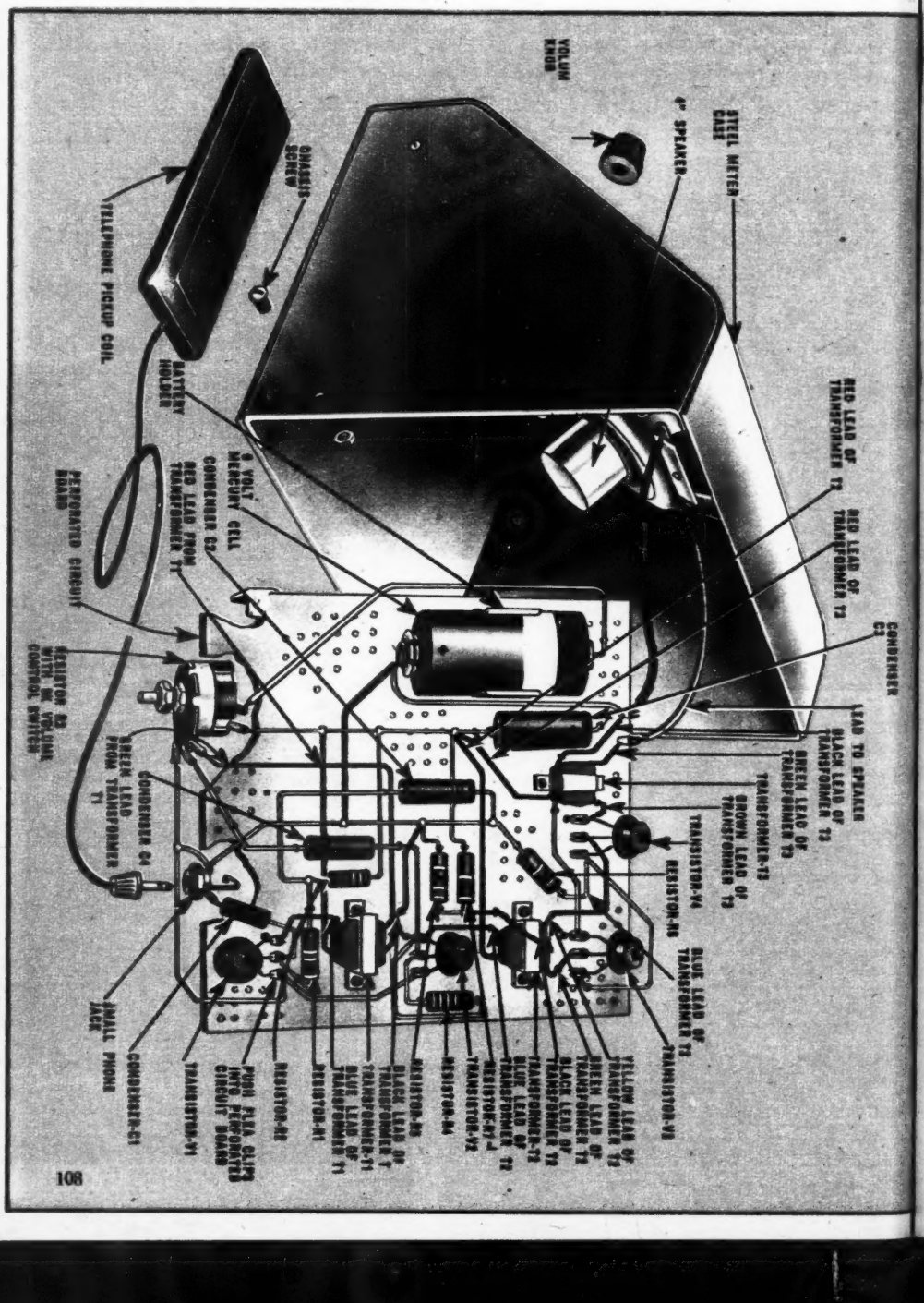
ALL COMPONENTS, except the speaker, mount onto the chassis board which is removed by loosening nuts and control knob.

WHEN INSTALLING SPEAKER LEADS, make sure that they are long enough to facilitate removal of chassis without cutting leads.





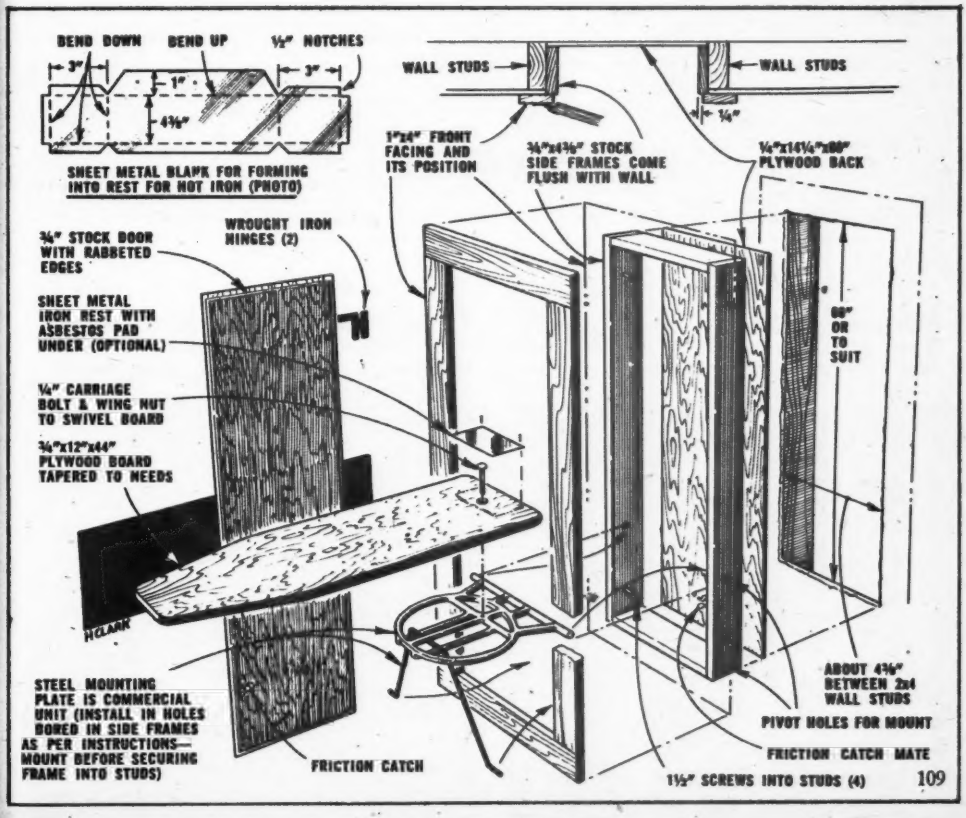
coupled stages. The last stage is push-pull for greater clarity and higher output. When idle, it only draws about five milliamperes because the last stage does not draw any current until a signal is applied to it. Yet it has plenty of "sock" and on a good signal will put out over a quarter of a watt, enough to drive the four-inch speaker with plenty of volume. Since [*Continued on page* 156]



Hideaway Ironing Board

By Russell Hanson

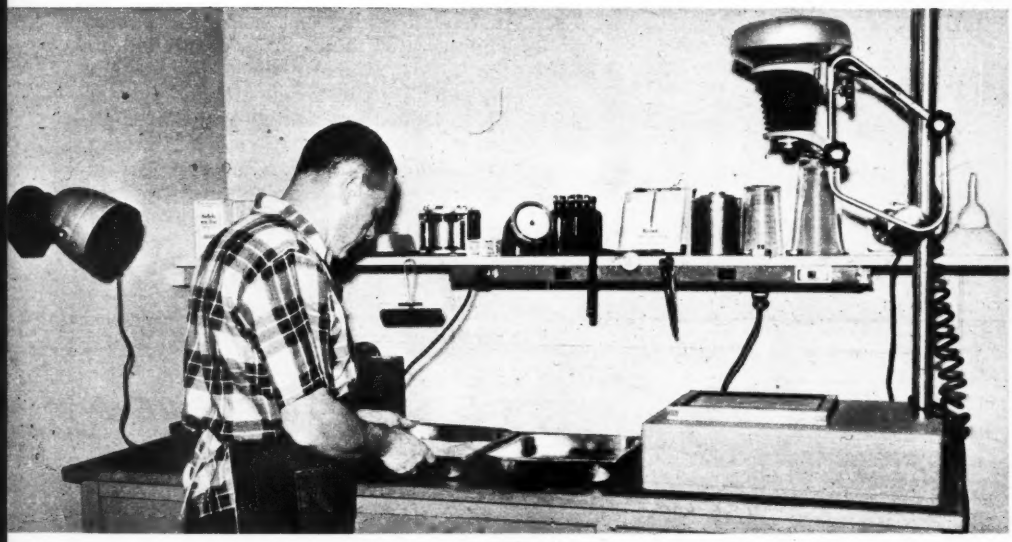
IF you really want to please your wife with your next workshop project build her this practical in-the-wall ironing board. It can quickly be readied for action or folded back out of the way just by lowering or raising the board. The elevated metal stand positioned on the bottom frame of the built-in opening permits safe storage for the hot iron. Aside from these features, the over-all design is very convenient when trying to maneuver and iron large pieces of clothing—there are no vertical supports to get in the way, although ironing board panels much longer than the one described here [*Continued on page* 154]



CELLAR DARKROOM

A spacious darkroom is the handiest gadget a photographer can own. Build this one against any cellar wall.

By Robert Brightman



Rear view of one of the two side walls. Studs are 2x4's on 16-in. centers. Note "cats" installed for extra nailing surface.

All the studs which rest on the ground were given a generous coat of wood preservative to protect them from rotting.

HAVE you ever wished, "Boy, if I only had a real darkroom!" With a few weekends of comparatively easy work, you too, can convert any clear cellar space into a darkroom. The only requirement is that you have at least one masonry or foundation wall for a starter—and all cellars have at least one wall!

Here is the method used to construct the darkroom described in these pages: Eleven feet of foundation wall were measured off. If you can measure from a corner, so much the better—less work for you. Then, at right angles to the wall, lines were drawn each eight feet long, thus making a rectangle, 8x11 ft.

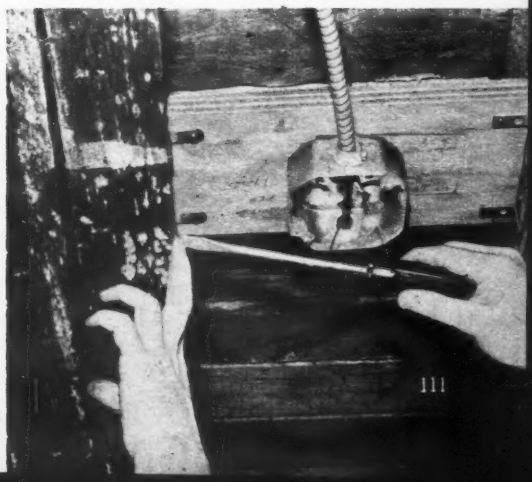
The first step in actual construction

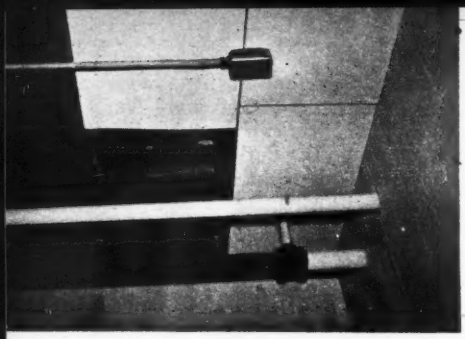
To cut the sliding door to an exact fit, two C-clamps and a 2x4 were used to guide circular saw. Door is Masonite-faced plywood.

Setting up the right-hand side wall. It consists of ⅛ in. thick Temprtile, scored to resemble tiles. It is nailed to the 2x4's.

A Whiz portable jig saw came in very handy for cutting the carefully measured openings in the wall panels for pipe passages.

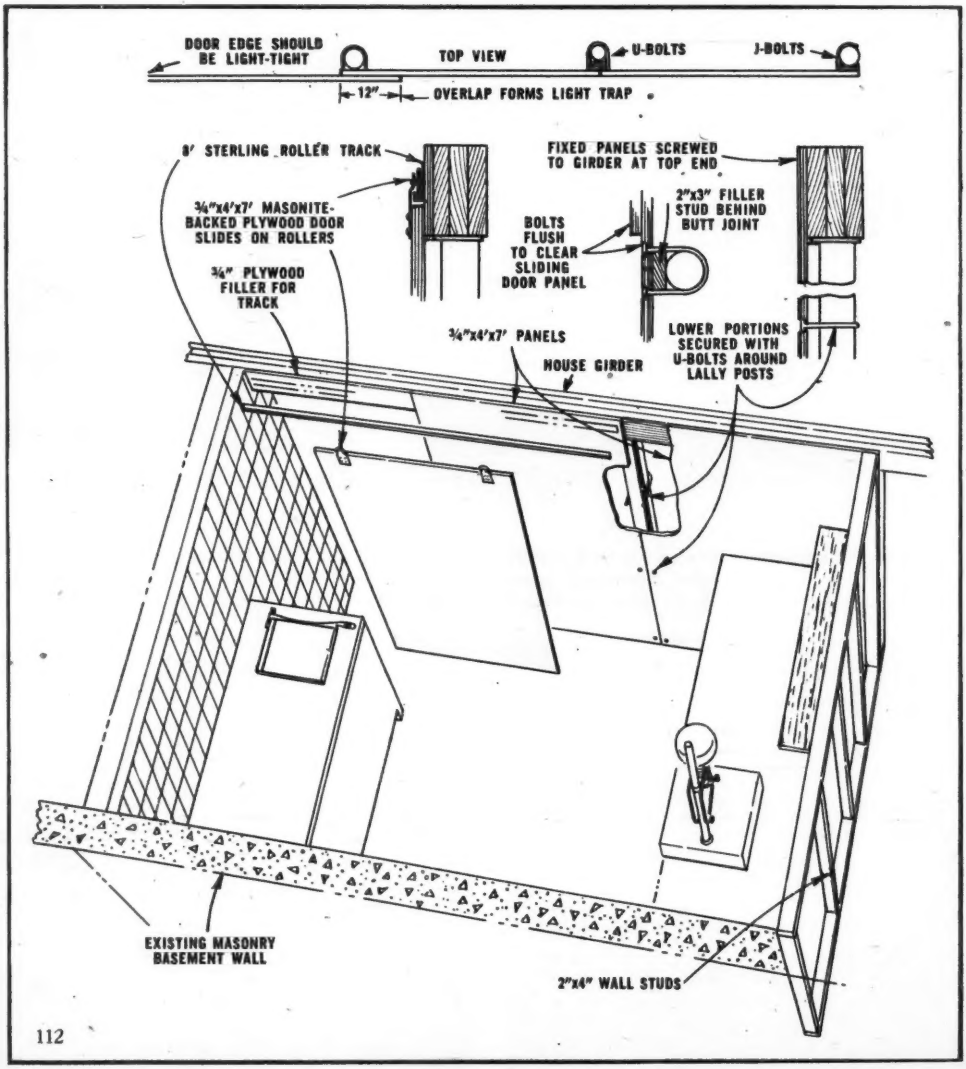
Note method of installing ceiling receptacle between beams. The No. 12 gage BX cable was connected to the nearest junction box.





Unfinished ceiling was covered with ¾ in. thick, 16x16 in. Fiberlite tiles. Visible pipes are for the thermostat, gas and steam lines.

View from inside of darkroom toward the cellar. Door slides on track shown behind the steam pipe at the top of picture.



consisted of erecting 2x4 studs to make up the two short walls. The eight-foot width was chosen in order to be able to utilize 4x7 ft. sheets of Temprtile. Each side wall then consists of two, 4x7 ft. sheets making a total of four required for both walls.

The eleven-foot dimension for the long wall was similarly chosen to take advantage of the standard dimensions in which hardboards are made. Three 4x7 sheets of ¾ in. thick Presdply formed the outside wall. Inasmuch as the darkroom is only eleven feet long and the total length of the three sheets is 12 ft., an overlap of one foot was thus left for a light trap. Two of the 4x7 panels were permanently installed with J-bolts and U-bolts fastened to the top, middle and bottom of existing lally columns. At the center where there was no lally column and one was obviously required to butt the two sides of the panels together, a lally column was formed by erecting an adjustable steel post. These posts, made by the Brainard Steel Company, are a godsend when doing such construction work around the house.

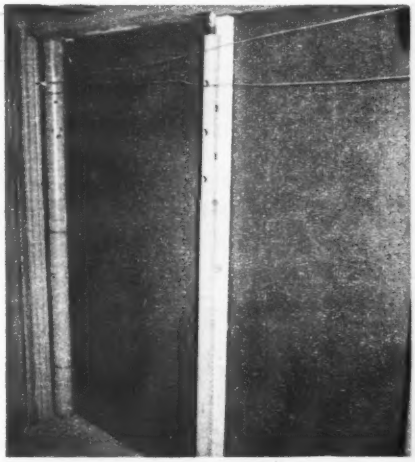
The next step consisted of installing a Sterling sliding door track to accept the third panel. The track is eight feet long, which means that the door can be pushed back to allow a three-foot opening; wide enough to allow a large workbench to be rolled into the darkroom.

The final step in actual construction consisted of covering the two side walls with the previously mentioned Temprtile. This material is ⅛ in. thick hardboard with a pre-scored finish which when painted forms a very smooth and tile-like surface.

Next, a lighting fixture was installed in the center of the darkroom. The entire ceiling was then covered with 16x16-in. tiles. After the sliding door was hung, the walls and door were given a coat of flat gray paint. Darkrooms, by the way, don't have to be dark. They should be dark only when the door is closed and lights are extinguished. Painting them black is old hat. A light cheerful color of whatever shade you prefer is the ticket.

The absence of a sink and running water in no way affects the efficiency of this particular darkroom. Washing prints, negatives and mixing the necessary chemicals are carried on over a board placed over half of a double-end wash-tub which is only a few feet from the entrance of the darkroom.

As an added convenience a shelf, eight feet long running across the complete width of the darkroom was installed as shown. A few holes and nails near the edge hold minor accessories. •



Tel-O-Post and 2x4 form extra lally column to which wall is attached with U-clamps.

Interior of darkroom was painted a restful light gray. Dark darkrooms are old hat.

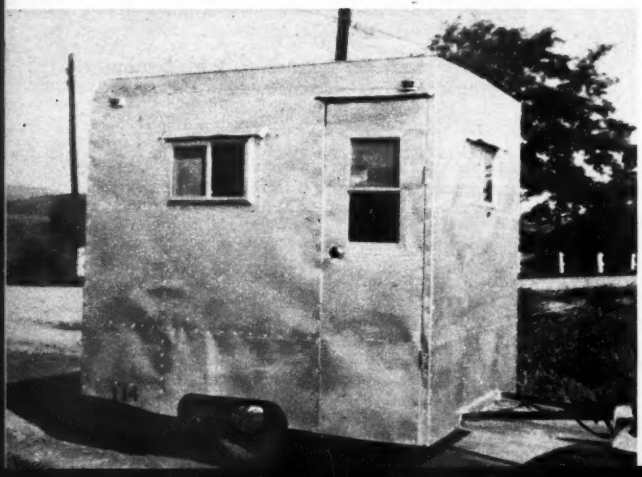
One side of the darkroom is devoted to "dry" work such as trimming and mounting photos.

Golden Hammer Award Winners

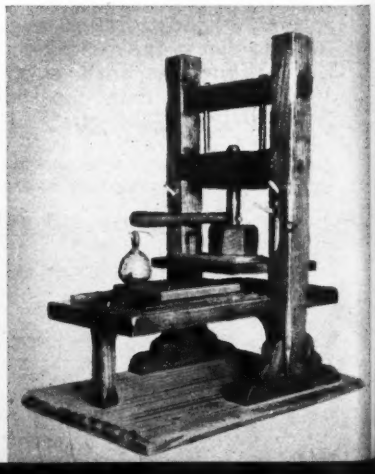
Each craftsman whose project is shown has received a 24-karat gold-plated Hammer and a Workbench Award Certificate. How about sending us a *black-and-white* photo and *full* description of your latest project? If you aren't a winner you may still receive as runner-up prize a 14-karat gold-plated Golden Hammer Tie Bar or MI's Certificate Of Merit. Photos of you and your workshop are also eligible. Send entries to MECHANIX ILLUSTRATED Golden Hammer Awards, 67 West 44th St., New York 36, N.Y. If you want entries returned, please enclose postage. Entries cannot be acknowledged.

RUNABOUT built from MI plan B-224, by 17-year-old Robert Houillon, La Grange Park, Ill., with a centerboard added to original design. Speed: 21 mph at 5 hp; cost: $85, less engine.

CAMPING TRAILER is 8 ft. long, 6 ft. wide, cost $300 to build. Frame is 2-in. angle iron from an old trailer; body is sheet metal. David H. Schmid, Greensburg, Penna.

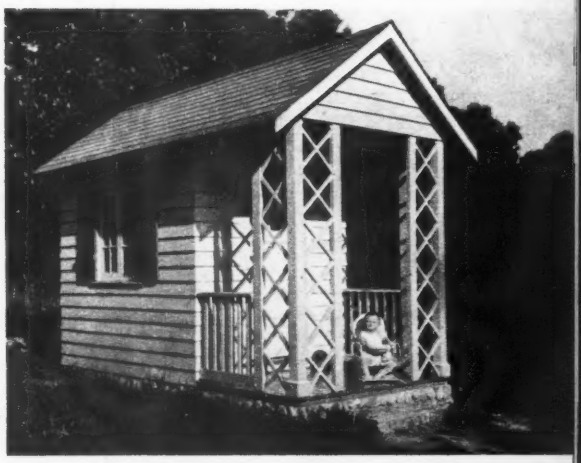


MODEL PRINTING PRESS constructed from drawings of the original Gutenberg press. The builder, John Wilson, Mt. Vernon, Ohio, actually uses it for special printing jobs.



The following craftsmen have been awarded GOLDEN HAMMER TIE BARS for their projects: Roger Cervi, Dublin, Ireland . . . Vernon Brown, Lebanon, Pa. . . . Oneal New, Anniston, Ala. . . . A. J. Henley, Middx., England . . . A. Williams, Flixton, Engl. . . . Howard Culbertson, So. San Gabriel, Calif. . . . Richard Desrumeaux, Redwood City, Calif. . . . Harold H. Klammer, West Warwick, R. I. . . . Jerry Tichy, Cedar Rapids, Iowa . . . William Warnick, Pittsburgh, Pa. . . . Quirino J. Bianco, Langhorne, Pa. . . . Bob Nandell, Iowa City, Iowa . . . Martin Hug, Elmhurst, N. Y. . . . Billy E. Tanner, San Juan, Tex. . . . H. B. McCullough, Harriman, Tenn. . . . Guy H. Diefenderfer, Auburn, Pa. . . . Robert D. Trautman, Rapid City, S. D. . . . F. Bergren, Brooklyn, N. Y. . . . Quentin R. Wonders, Miami, Fla. . . . Don McCredie, Ottawa, Ont. [Continued on page 181]

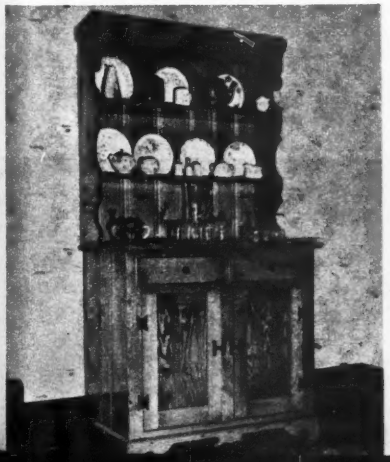
HI-FI PARTS CABINET contains Rek-O-Kut turntable, Fisher FM tuner, McIntosh 30 watt amplifier plus room for record storage. Built by John Payne, Washington, D. C.



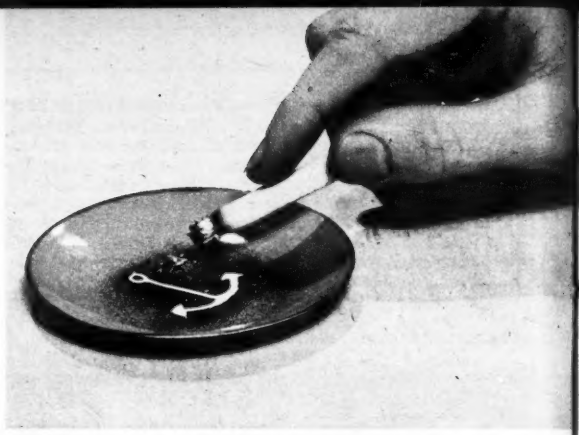
DOLL HOUSE designed and built by Vincent Gaegler, Falls Church, Va., is 8 ft. long, 9½ ft. wide. Interior has hardwood floors, wallboard ceiling. Note the French windows.

EARLY AMERICAN cupboard built from MI plan F-14, by Robert Pilgrim, Canton, Ohio. The piece is made from ¾-in. white pine with fir plywood doors and knotty pine sides.

POWER MOWER uses '40 Studebaker parts, has engine mounted in rear. Two transmissions give it six forward speeds. Built by W. Buchanon, Indian River City, Florida.



The art of enameling on metal is easy to learn and fun to do.



By Emanuel Berger

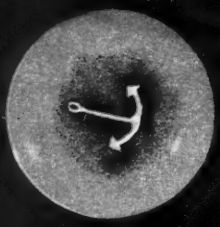
Personalized Ash Trays

All the materials you'll require for enameling on metal. Kiln is in background; bottles contain lacquer, gum solution and different enamels; tray up front rests on an asbestos block.

IN its more advanced phases, the art of enameling on metal is an intricate and painstaking process which requires a great deal of skill. However, the amateur can produce simple pieces with a minimum of know-how. The ash trays shown on these pages, made as gifts for friends, are examples of simple, yet decorative work.

Enamels are actually finely powdered glass colored with metallic oxide. The process of enameling involves heating enamel-coated metal to the point where the enamel begins to flow, then allowing it to cool. Upon cooling, the enamel adheres to the metal and the result is a thin coat of colored glass which is quite elastic and highly resistant to acid stain or hot ashes.

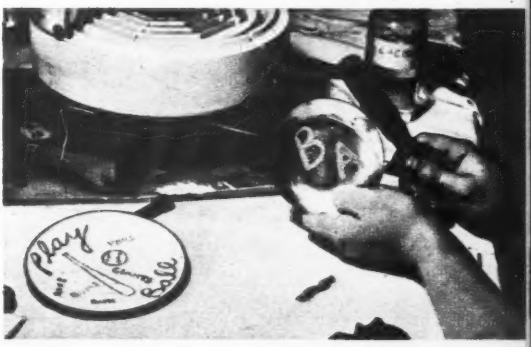
All the materials for enameling can be purchased at your local hobby shop or department store. As a beginner, be sure to buy opaque enamels. When you have become more advanced, you can try transparent ones. The kiln shown is called the Trinkit Studio Kiln and is manufactured by Modern American, Bloomington, Ill. It retails for about $17.50 and is suitable for making trays larger than 2 inches in diame-



Gum solution, applied to thoroughly clean tray, allows enamel to adhere until fired.

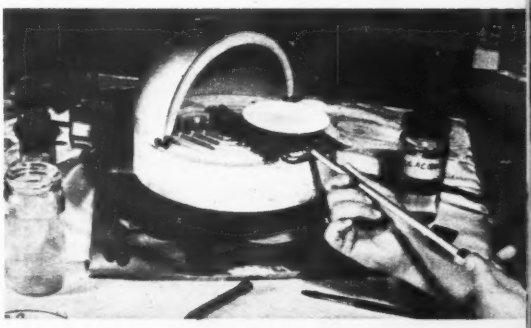
Enamel powder is dusted onto gummed tray surface by tapping it through fine mesh.

Right: Excess enamel powder is tapped off initials formed on tray with gum solution.

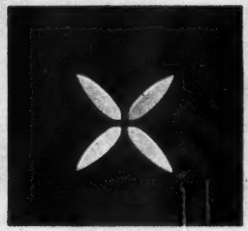


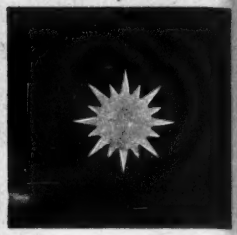
ter. For smaller work, such as earrings, pendants, and cuff links, there is a small Trinkit which sells for about $4.50. Other items required are: gum tragacanth, which can be purchased in a drug store in dry form and mixed as required; a finely pointed metal instrument; fine steel wool; emery cloth; artist's brushes; an old stocking, through which the enamel is shaken for uniform distribution; and copper trays which you can buy prepared or hammer into shape from flat stock.

To make an enameled ash tray, first wash the copper tray thoroughly, using steel wool and a detergent. The tray is clean when water will wet it completely and not seem to run away from some spots. This is important to make the enamel adhere well. Next place the dry tray on clean white paper which will catch spilled [*Continued on page* 178]



Right: Ash tray is placed in the kiln for first firing. Letters or designs are added after the surface has been made smooth.





1. FLOORING TILES with decorative brass inserts, for game rooms, etc., come in many designs. Tiles are vinyl, rubber or asphalt.

MI's Hardware Store

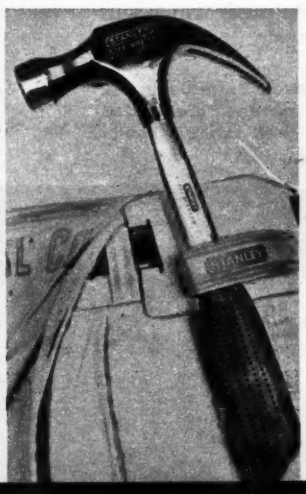
For more information write to:

1. Kentile Co., 58 Second Ave., Brooklyn 15, N. Y.; 2. Faircraft Corp., 41 New St., West Haven, Conn.; 3. Taylor Mfg. Co., Stepney Depot, Conn.; 4. Stanley Tool Co., New Britain, Conn.; 5. Southern Heater Co., Inc., 844 Baronne St., New Orleans, La.; 6. CBC Electronics Co., Inc., 2601 N. Howard St., Philadelphia 33, Pa.; 7. Roben & Jones Industries, Inc., 89 Harvey St., Paramus, N. J.; 8. Petersen Mfg. Co., Inc., De Witt, Neb.; 9. Scott Mitchell House, Inc., 611 Broadway, New York 12, N. Y.; 10. Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa.; 11. Slaymaker Lock Co., Lancaster, Pa.; 12. Channel Master Corp., Ellenville, N. Y.

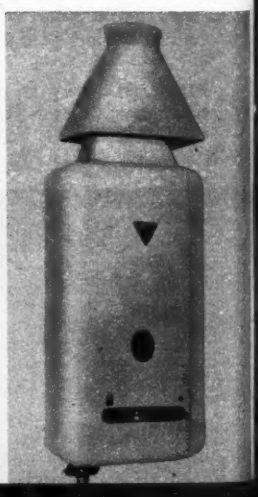
2. JUNIOR DERBY RACER is available in kit form. All parts are precut, can be assembled with hand tools; weight complete, 60 lbs.

3. GRIP-ALL VISE CHUCK holds irregularly shaped objects firmly in vise. Will not damage thin-wall copper tubing.

4. ALL-STEEL HAMMER with a neoprene grip bonded to it, comes in 13, 16 and 20 ounce weight; curved or ripping claw.



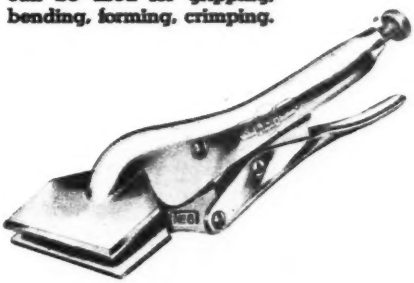
5. HOT WATER HEATER for week-end cottages will operate on natural or liquefied gas; heats 120 gallons per hour.

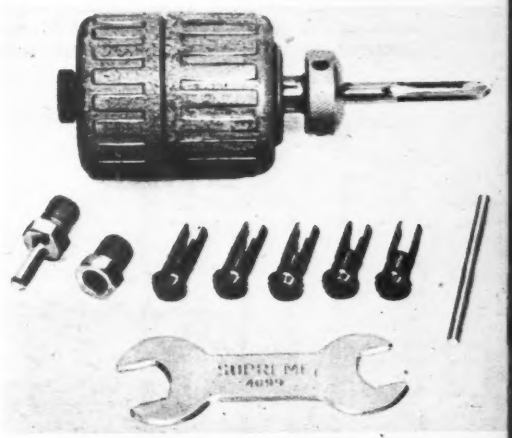


6. HEAVY DUTY multiple outlet box for home workshops has six replaceable outlets and on-off switch, is rated at 15 amps, 110 v.

7. AQUA-SITTER FEEDS FISH automatically a correct quantity of food. Unit has self-starting motor, disburses food every 24 hours.

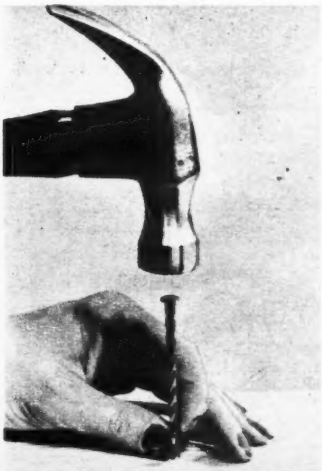
8. SHEET METAL TOOL can be used for gripping, bending, forming, crimping.





9. SPEED REDUCING ATTACHMENT for portable power drills reduces speed by 7:1 ratio, thereby increasing torque by same amount.

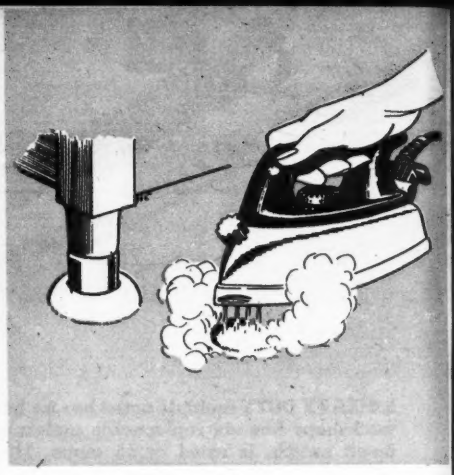
10. NEW SPIRAL NAIL is said to have greater holding power, is easier to drive and reduces most wood splitting.



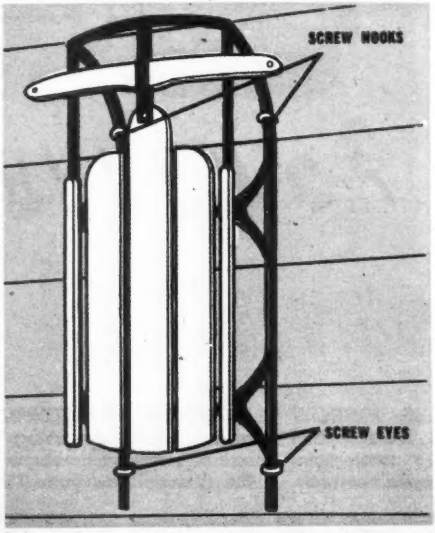
11. SOLID BRASS WINDOW SASH provides locking and ventilation at the same time; adjusts to three open positions.

12. INDOOR TV ANTENNA sits on top of set, has tuning knob whose numbers correspond to the channels on your TV set.

TERRACE TABLE is made with parquet squares left over from flooring job, has half-inch plywood base, wrought iron legs.



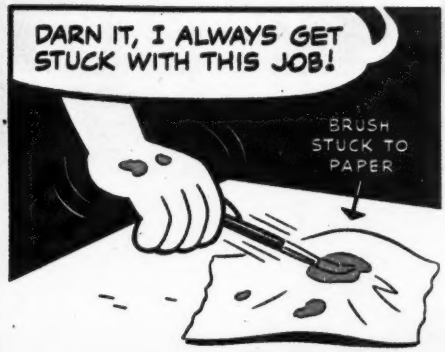
STEAM IRON is used to raise rug nap flattened by heavy furniture. Iron should be held above surface, not allowed to touch.

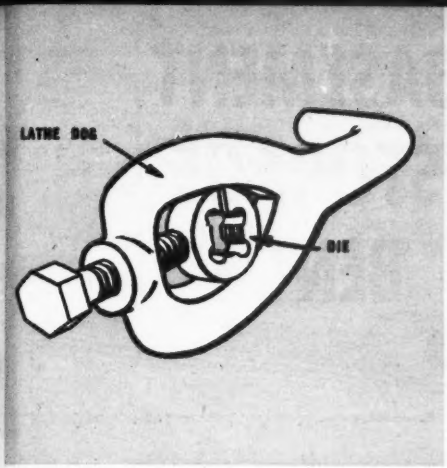


HOME AND SHOP TIPS

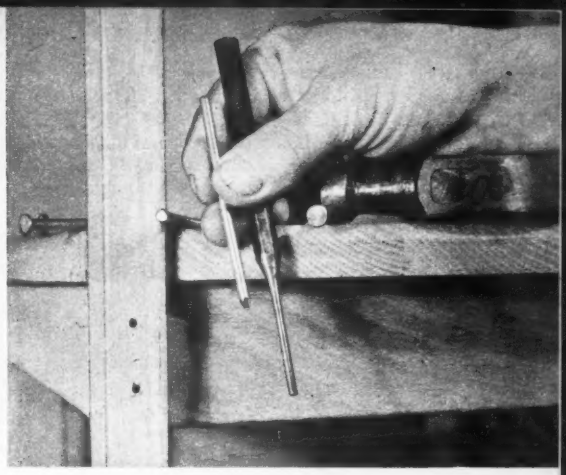
SLED HANGER is made from large screw eyes and hooks secured to wall as shown, helps keep garage uncluttered in summer.

FREDDIE FUMBLES



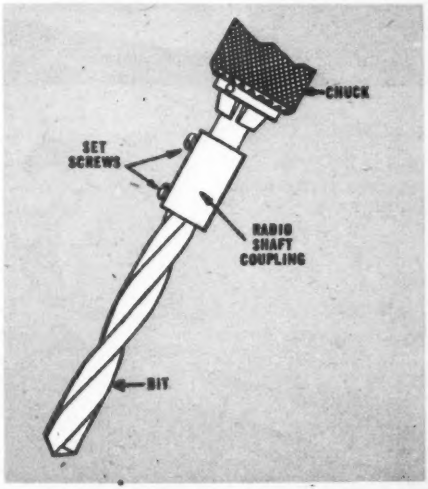


LATHE DOG serves as emergency die holder, is handy when space limitation prohibits use of conventional long-handled holder.



METAL DOWELS cut from nails serve to repair loose furniture joints; glue joints, countersink nails, cover holes with filler.

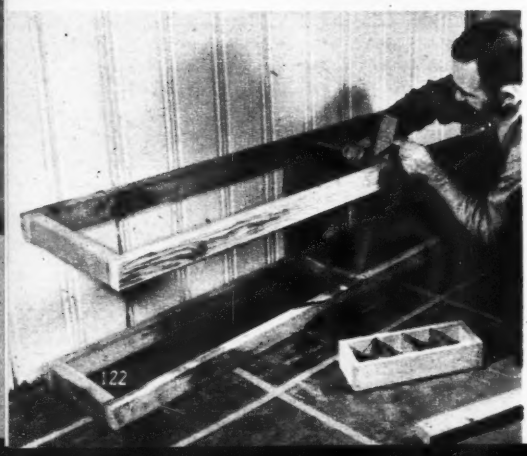
RADIO SHAFT COUPLING makes an excellent drill stop when it is fastened in place with setscrews.



Send Freddie Fumbles your idea of a good short-cut, time-saver or safety device in your work, whether it be in the home, shop, office or farm. Each tip accepted will be paid for at the rate of $10. Naturally we cannot acknowledge or return the ones we cannot use. However all will be carefully read and evaluated. (Those which we can use in other departments of MI will be paid for at our regular rates.) Please send in your ideas on a post card only. Address to Freddie Fumbles, *Mechanix Illustrated*, 67 W. 44th St., New York 36, N. Y.

BASEMENT STORAGE BENCH

The frame is made in two sections; joints can be butted and nailed for quick assembly.

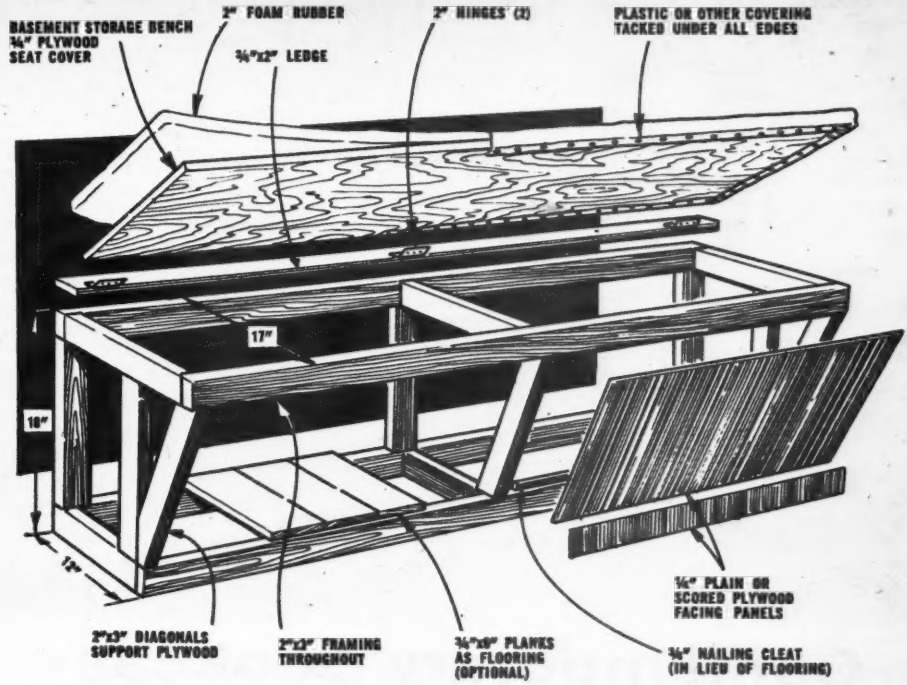


Hold the front uprights against the frame, as shown, to get the proper cutting angle.

IT won't take more than an evening's effort to build a practical wall seat for your recreation room or basement. Make it long enough to seat four or five people, and it will help keep the room clear for parties and folk dancing without the clutter of numerous chairs.

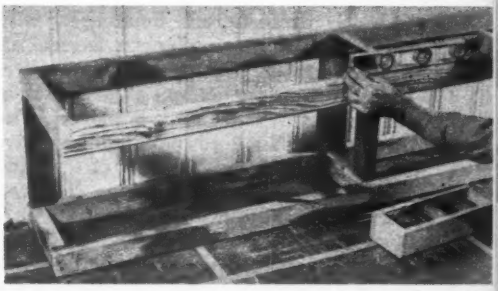
The sturdy bench has a hinged top of ¾-in. plywood, so you can use the compartment underneath to store toys and games out of the way. The bench can also serve as a spare guest bed if you make the top somewhat wider than the 17-in. shown on the sketch. A 2-in. thick foam rubber pad covered with chintz or plastic sheeting will give you a very comfortable night's rest.

The bench consists of a frame made with 2x3's, covered at the front and sides with decorative plywood such as Weldtex, Etchwood, or leather-grain composition board. Start construction by forming the bottom and top frames,



one 12, the other 17-in. wide, both of the desired length. Corners can be butt-joined and nailed together. At the center of each section nail in a cross-member for reinforcement.

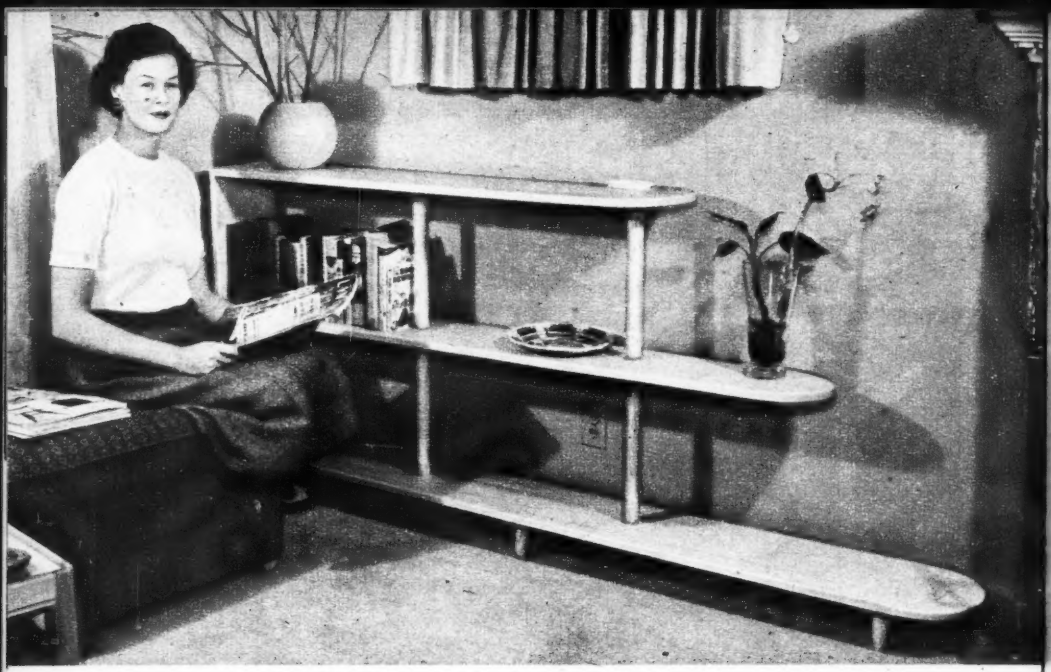
Place the bottom section in position along the wall, then use a carpenter's level and insert thin wedges underneath where necessary to level the frame if the floor is uneven. Cut five uprights to a length which, when combined with the top and bottom frame sections will bring the total height of the bench frame to 16 or 18 [*Continued on page* 182]



Center upright holds frame while it is leveled, then the two corner posts are cut.

Note how mitered corner uprights fit under top frame. Use glue and nails to attach.

The sloped front edge of the bench gives comfortable leg room and better appearance.



Contemporary Bookcase

THIS three-tiered bookcase, with shelves of varying length, is ideal for use in a corner, particularly when a fireplace or window occupies the center of the wall against which it is placed. The open shelves have rounded ends and are supported with dowel poles of the kind found in most clothes closets. You can build one easily, even if you have only basic carpentry tools. Power tools will make the job even simpler, and the jointing will be improved because the upright can be dadoed for added shelf support.

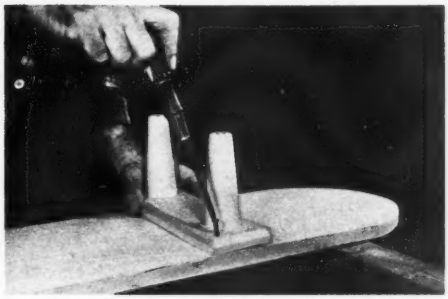
Clear pine, 10-in. wide and 1-in. thick, is used for the shelves and the upright. One 9-ft. length of lumber will serve for the longest shelf and the upright; an 11-ft. length will be sufficient for the other two shelves. In addition, 5-ft. of 1½-in. diameter clothes pole and three pairs of 3¾-in. tapered round legs are required. If you have a lathe, you can turn the legs yourself; otherwise they can be purchased from crafts supply dealers. Of course the dimensions indicated are for the shelf shown and can be altered.

First saw the three shelves to the proper length and check one end of each with a square so the joints at the upright will be neat. Next use a compass to draw the rounded end on a piece of cardboard; then cut it out and trace the arc on each of the shelves. Make the circular cuts with a jig saw, saber saw or coping saw; then file the edges with a rasp and smooth them with sandpaper.

Using an expansion bit, bore 1½-in. holes in the shelves to make a snug fit for the dowels. The center shelf is bored clear through and the top and bottom shelves are bored to no more than half the thickness of the lumber. It is important to have all the holes lined up perfectly. This is done by boring the holes in the center shelf first and then laying this shelf on the other two to serve as a guide. When doing this, be careful that the center shelf is positioned so as to take the joint at the upright into account. Depending on whether a dado or a butt joint is used at the center the location of the holes will be different.

The shelves and dowels are assembled before the upright is installed. First cut the dowels, allowing for the depth they will go into the partly bored holes. Then

Rounded ends of shelves are cut with coping saw, finished with rasp and sandpaper.

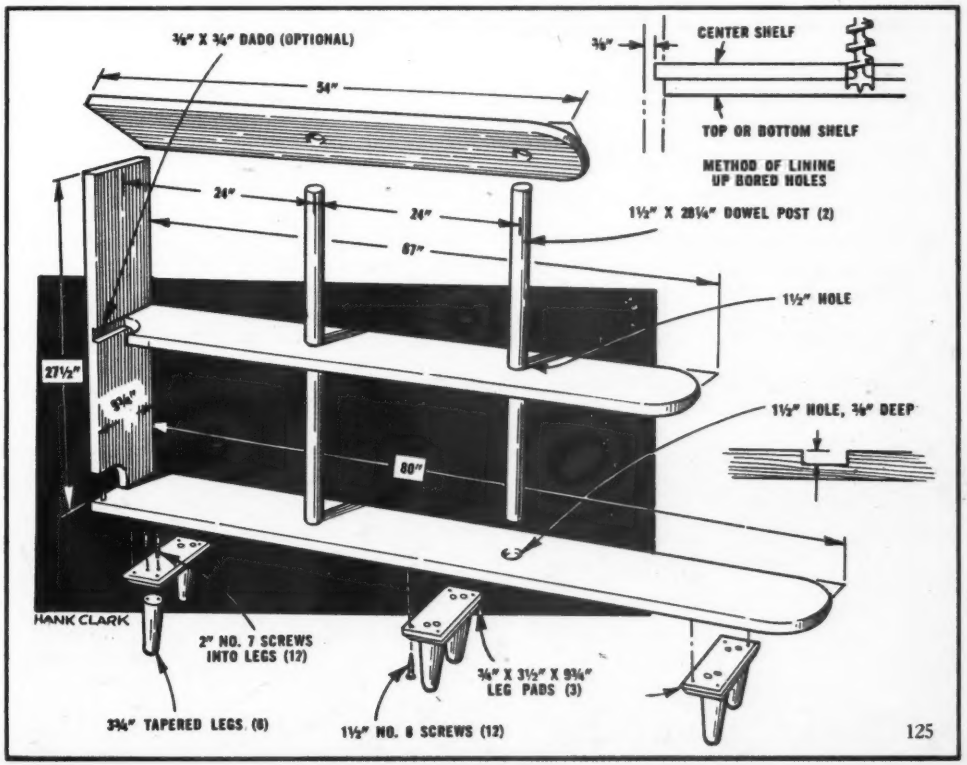


Peg legs are screwed to chamfered blocks which are then fastened to bottom shelf.

the dowels are passed through the holes in the center shelf and glued in the holes in the top and bottom shelves. The center shelf is held by brads which are toenailed through the shelf and into the dowels. Drive the brads in at the back where they won't be seen. For greater strength, turn wood screws into the dowels through the bottom shelf and drive finishing nails in through the top shelf. Countersink the nails and fill the holes with putty.

The upright is now cut to size and installed. You can either cut a dado to receive the center shelf or fasten it in place with wood screws driven through the upright. Should you use the screws, bore and countersink pilot holes first so there will be no danger of splitting the wood. Naturally, the decision to use a dado or screws must be made before assembling the shelves.

Complete the job by installing the legs as illustrated. The wood can be stained or left natural. In either case, apply two coats of shellac, sanding lightly between coats. •



NESTING CERAMIC TABLES

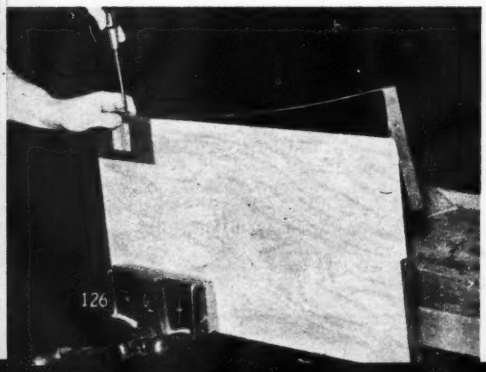
Make this pair of tile-topped tables as a useful addition to your indoor or outdoor living.

CERAMIC tile combined with simulated wrought iron makes these nesting tables an attractive addition to the home. They can be used indoors in any room or outdoors on the lawn, porch or terrace.

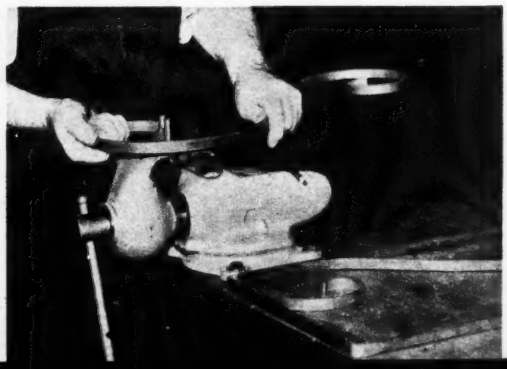
Make the larger table first. Using exterior plywood, cut the top to the dimensions indicated and then bend the $\frac{1}{16}$x1-in. cold rolled steel to fit around its perimeter. Next drill the holes in the metal with a No. 18 drill and countersink them. Then fasten the band to the plywood with 1-in., No. 8 flathead wood screws, leaving ⅛-in. overhang at the bottom. This allows enough overhang at the top to form a frame for the tiles.

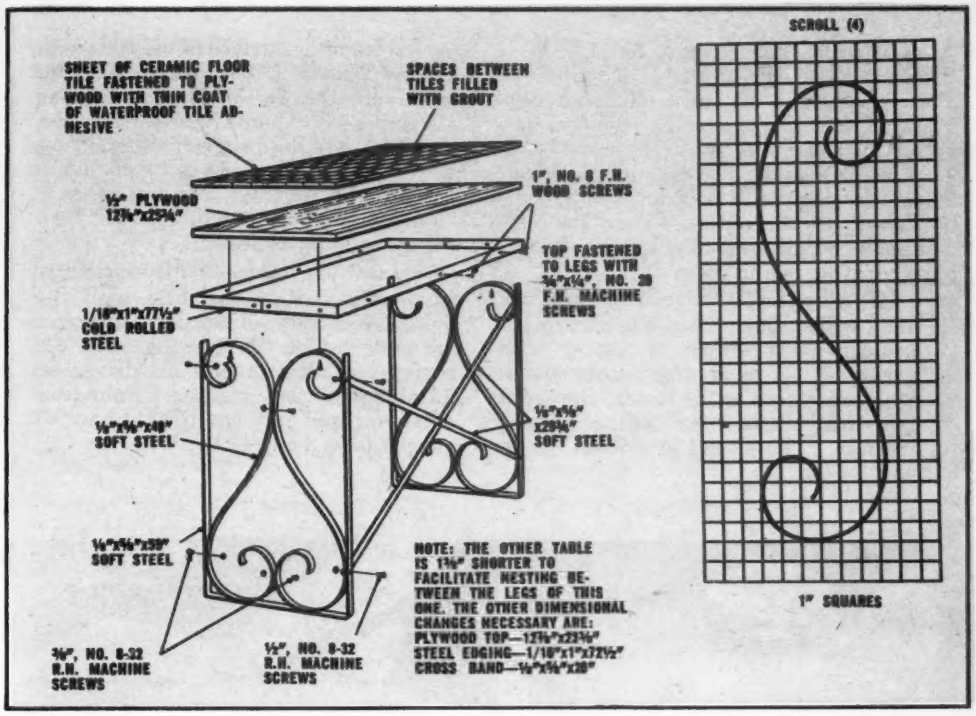
The scrolls for each leg are bent to the shape shown in the drawing and fastened together at the points where they meet with ⅜-in., No. 8x32 roundhead machine screws and nuts. Then the 59-in. lengths of soft steel used to reinforce each pair of scrolls are bent so that they are 23 in. on each side and 12⅞ in. across the bottom. They, in turn, are fastened to the scrolls with No. 8x32 roundhead machine screws and

Plywood top of each table is edged with a band of 1/16x1-in. cold rolled steel.



The scrolls are bent to the proper shape, fastened together and fitted into frames.





nuts, using ⅜-in. screws on what will be the front side of the table and ½-in. screws on what will be the back.

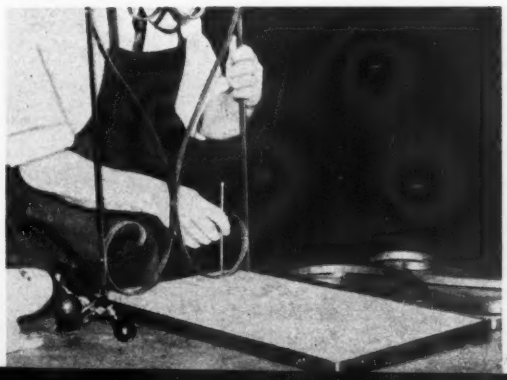
The completed legs are fastened to the plywood top with ¾x¼-in., No. 20, flathead machine screws which are driven through from the top surface of the plywood and secured with nuts. Then the cross braces are fastened at the rear, using the longer, ½-in. screws.

Before going ahead with the setting of the tiles, give the edge band around the top two coats of flat black enamel. In fact the whole table can be painted at this time, though it isn't necessary to paint the top surface of the plywood.

Ceramic tile, sold in paper-backed sheets, is available in a great variety of colors and sizes. The backing comes off when it is soaked with warm water. Many patterns can be worked out to your own taste. However, lay out the pattern in advance so that the tiles will be ready to set in place.

When the tiles are ready, coat the plywood surface with an adhesive such

Legs are fastened to the top with machine screws. Here, holes are being located.

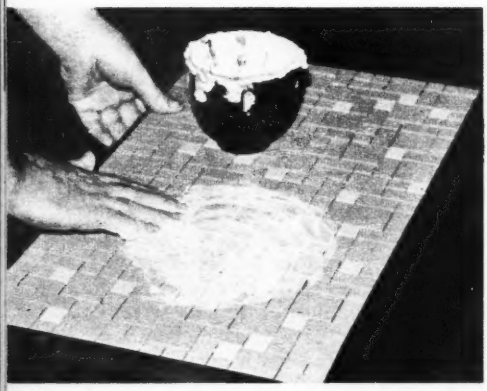


Saw-toothed spreader is used to apply the waterproof tile adhesive to the table top.

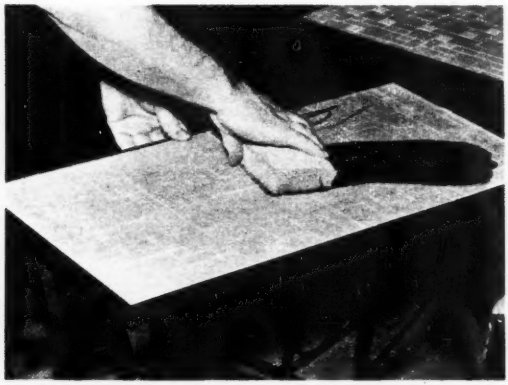
as Miracle, Sure Bond or 3M11. Use a saw-toothed spreader. You will have just the right thickness when the plywood shows between the ridges of adhesive. The tiles are then pressed into place. Should any adhesive be forced up between the tiles, clean it away with thinner or turpentine. Then the tiles should be allowed to set firmly. This takes from one to three days.

Next the joints between the tiles are filled with grout. This is a waterproof white cement which is mixed with water. It can be applied with a squeegee, cheesecloth or the hands. Spread it over the whole area, filling all the crevices. The excess grout can be removed from the surface of the tiles with a damp sponge. A damp piece of cheesecloth removes the last traces, leaving attractive white joints between the tiles. Should you so desire, the joints need not be white. Different pigments are available from your dealer. The grout should be allowed to cure for three days; then the table is ready for use.

The second table is made slightly smaller so that it will nest with the first. Necessary dimensional changes are indicated on the drawing. The tile surfaces of these tables are fireproof, durable and easily cleaned. No matter what you spill on them, it can be wiped away with a damp cloth. •



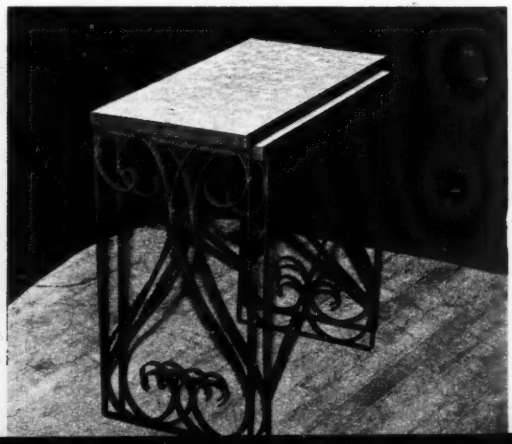
When tiles are in, joints are filled with waterproof grout which is spread by hand.

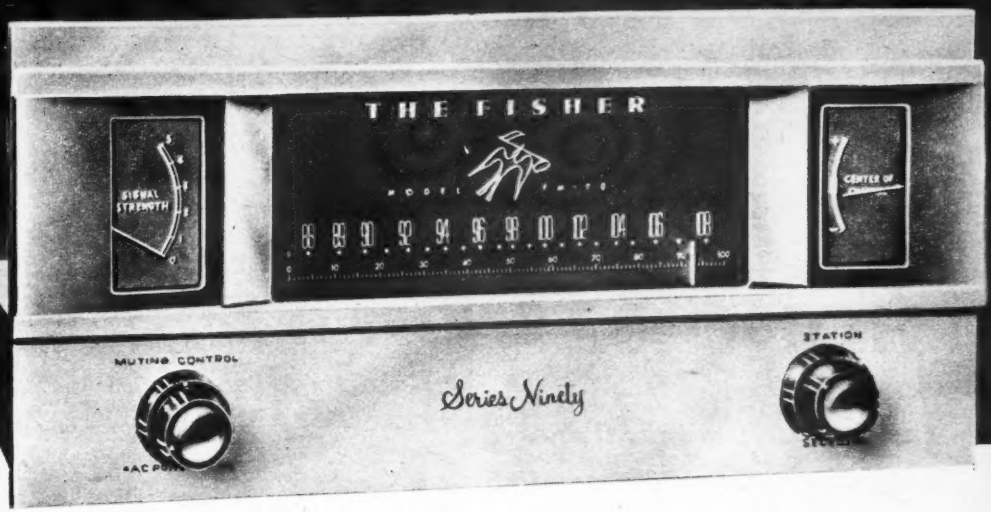


Clean excess grout from surface with damp sponge; then allow three days curing time.

Finishing surfaces with two coats of flat black enamel creates wrought iron effect.

Cross bracing on side of each table makes for greater strength, yet permits nesting.





1. THIS 33RPM TEST RECORD for checking your hi-fi system is calibrated from 20,000 to 18.75 cps, gives accurate indication of performance of every part of the system.

2. LATEST FISHER FM TUNER, FM-90, uses variable AFC control, wide-band detector, signal and center-of channel meters. Has to be used with a separate power amplifier.

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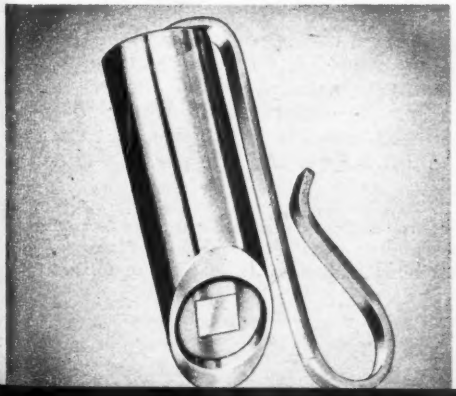
HIGH FIDELITY

For more information write to:

1. Electra Records Corp., 361 Bleecker St., New York 14, N. Y.; 2. Fisher Radio Corp., 21-21 44th Drive, Long Island City 1, N. Y.; 3. Mercury Scientific Prods. Corp., 1725 West 7th St., Los Angeles 17, Calif.; 4. Gray Research & Development Co. Inc., Manchester, Conn.

3. THE DIS-CHARGER contains radioactive material to eliminate static charges on record surfaces. The tiny plastic device weighs ½ gram, clips to the pickup arm.

4. NEW TURNTABLE is available with 4-pole or hysteresis motor, comes with ¼-in. thick steel mounting plate. Weight: 40 lbs. Wow and rumble betters NARTB requirements.

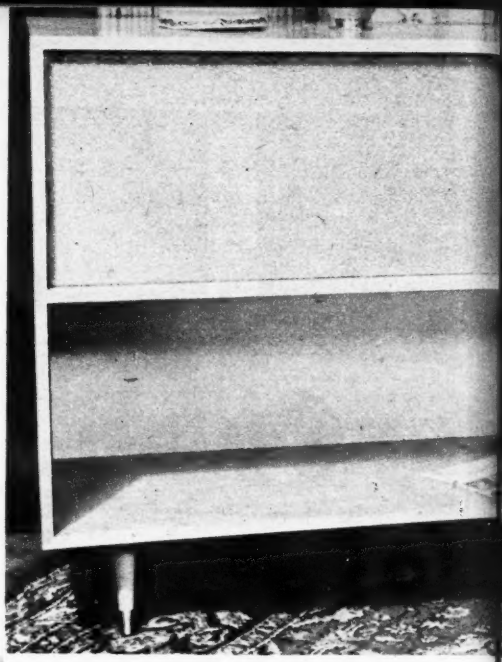


HIGH FIDELITY

PHONO-BAR

You can entertain your friends with music and drink at this functional combination unit.

By Robert Lelle

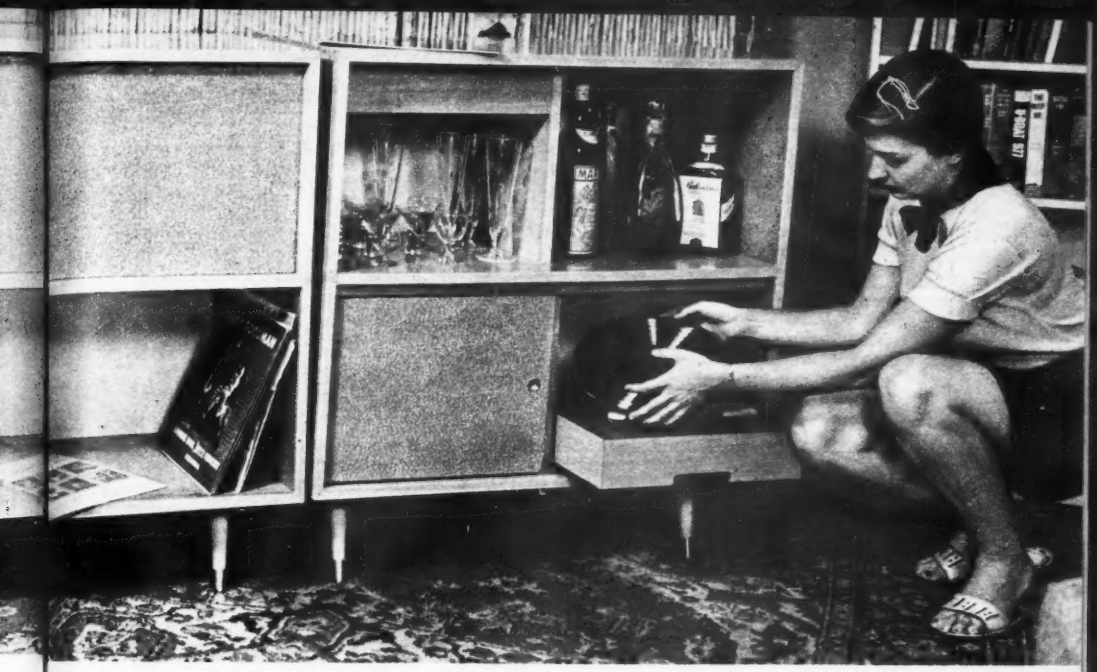


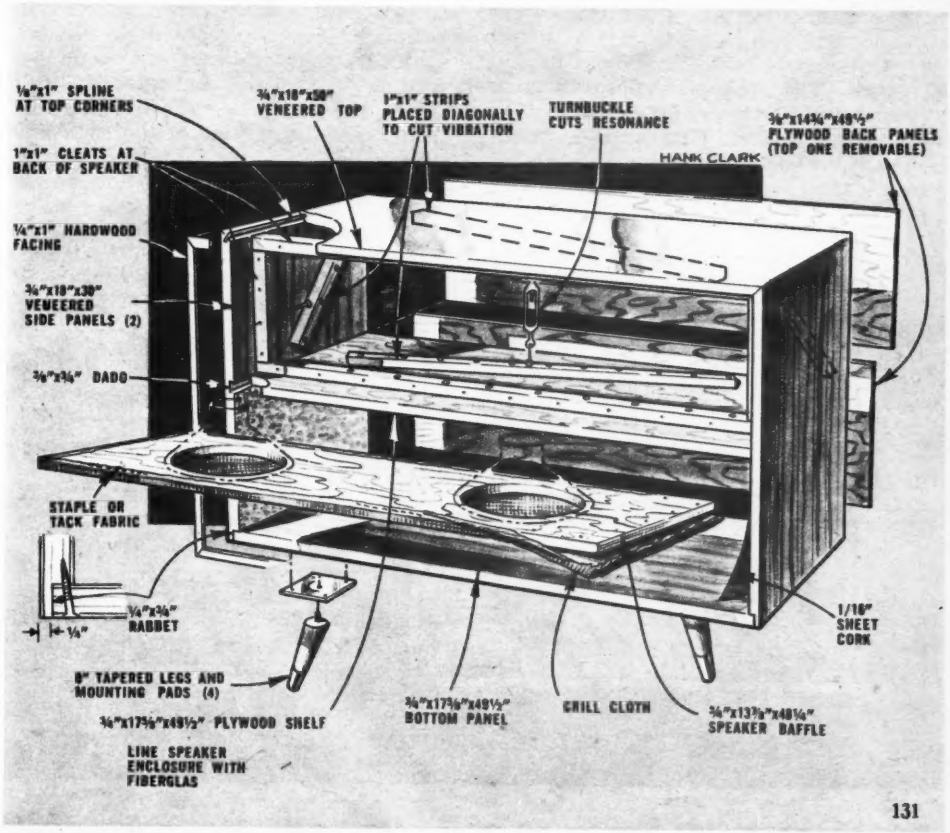
Sliding doors of the bar unit are covered with fabric matching that of the speaker enclosure; the record changer slides out.

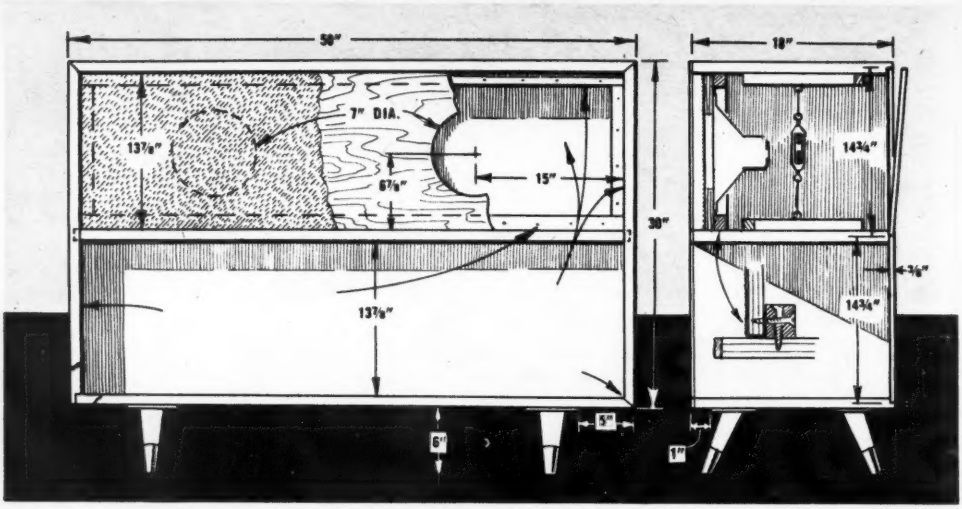
Mixers, coasters and all bar accessories are kept in drawer above glasses; amplifier housing, below, is faced with fabric.

FOR those who like to mix their music with an occasional liquid refreshment, this low-cost modern combination unit should be the ideal solution to both problems. One unit houses the two-speaker cabinet and has a storage area for about 200 records. The other contains a turntable and amplifier plus enough space for several assorted liquor bottles and glassware. An AM-FM tuner can easily be installed below the amplifier. Both cabinets can be positioned side by side as shown or can be placed up to 50 feet apart.

Start construction by laying out the veneer plywood panels, noting the direction of the grain. Rip the top and side pieces, cut the mitered top edges and make the ½-in. deep grooves that will accept the connecting splines. Five ⅜x¾-in. dadoes are cut along the inside faces of the tops and sides. Finally, make the ½x¾-in. rabbets to accept the bottom assembly and the ½x⅜-in. rabbets for the backs. On the top, bottom and side pieces of the




⅛"x1" SPLINE AT TOP CORNERS
¾"x18"x50" VENEERED TOP
1"x1" STRIPS PLACED DIAGONALLY TO CUT VIBRATION
TURNBUCKLE CUTS RESONANCE
⅜"x14¾"x49½" PLYWOOD BACK PANELS (TOP ONE REMOVABLE)
HANK CLARK
1"x1" CLEATS AT BACK OF SPEAKER
¼"x1" HARDWOOD FACING
¾"x18"x30" VENEERED SIDE PANELS (2)
⅜"x¾" DADO
STAPLE OR TACK FABRIC
¼"x¾" RABBET
¼"
1/16" SHEET CORK
8" TAPERED LEGS AND MOUNTING PADS (4)
¾"x17⅝"x49½" PLYWOOD SHELF
¾"x17⅝"x49½" BOTTOM PANEL
GRILL CLOTH
¾"x13⅞"x48¼" SPEAKER BAFFLE
LINE SPEAKER ENCLOSURE WITH FIBERGLAS

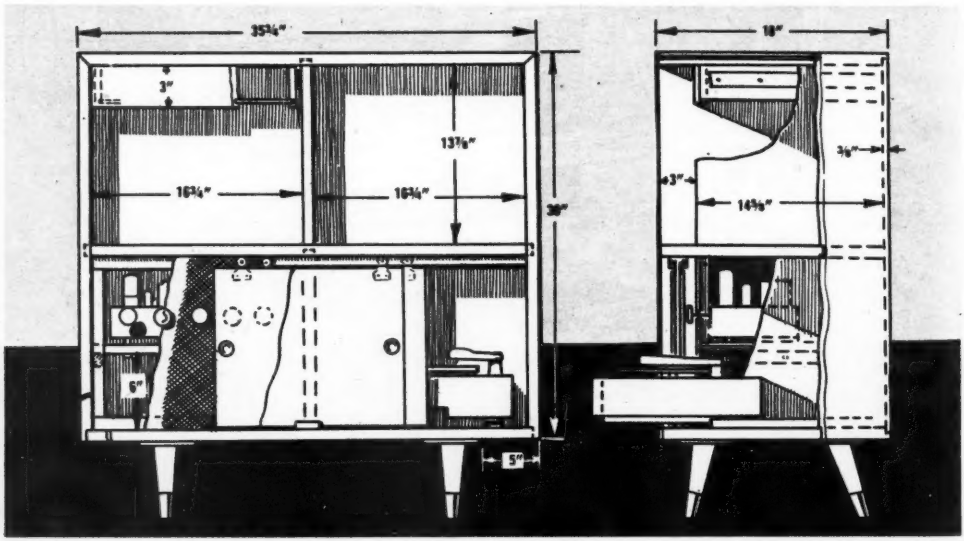


inside of the speaker enclosure attach a strip of 1x1-in. hardwood, approximately 18 to 24 in. long. Place the strips diagonally with the length of the wood. The purpose of this is to reduce resonance within the enclosure.

Cut out two backs from ⅜-in. fir plywood. The speaker enclosure's back consists of two pieces for easy removing in case of repairs. Cut an 8x3-in. opening in the back of the bar unit, positioning it to fit over the rear of the amplifier housing. Cover this with wire mesh to serve as ventilation for the amplifier.

You're now ready to cut the shelves and center uprights; ¾-in. fir plywood is used here. The exposed front edge will later be covered with a veneer strip. Uprights and shelves are cut according to the size indicated in the plans. After cutting, make a ⅜x¾-in. dado on the underside of the shelf on the smaller unit.

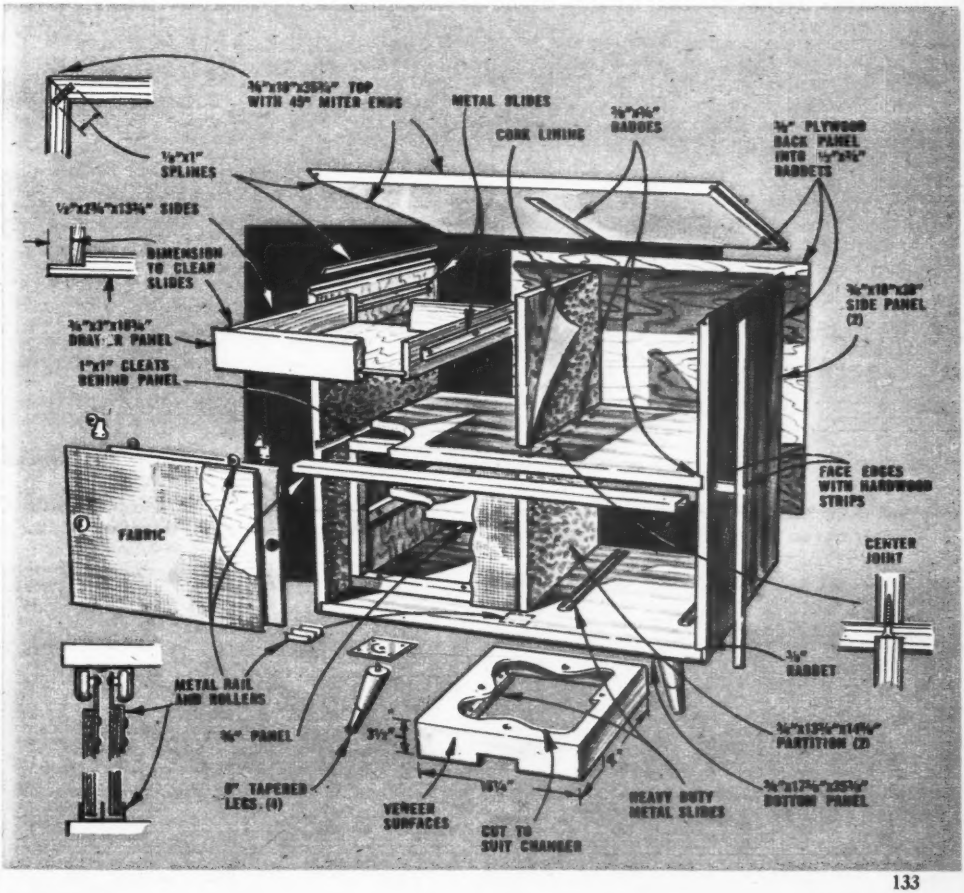
First step in assembly is to bore holes



through the bottom assemblies (for fastening to sides) and through the shelf of the smaller unit (to fasten to the upright). Screw the bottom assembly to both sides. The inside edge of the rear rabbets in the sides should be perfectly flush with the rear edges of the bottom assemblies. Glue the shelves and stand the assemblies upright to install the tops. Apply glue to all spline grooves and lower the top in place. With very little effort the splines will become engaged in their respective grooves in the top panel. Insert and glue the uprights, keeping them only flush to the *rear* and using screws as shown in the drawing. To get perfect joints clamp up the frame overnight. When the glue has dried completely you may begin adding your hardwood veneer.

Make the upper storage drawer for the smaller unit, cutting the drawer front to size from ¾-in. plywood. Cut the side members and backs from ½-in. plywood or hardwood stock. Assemble front, back and sides with glue and nails. No nails are used for the drawer front; a layer of glue is adequate here. Slide in the ¼-in. bottom, either plywood, hardwood or Masonite. The total width of the drawer is governed by the space consumed by the aluminum drawer slides.

The record changer drawer is constructed by also using ½-in. plywood or hardwood. Assemble side and front members with glue and nails. Before installing the top, transfer the record changer template and cut out the opening. [*Continued on page* 180]



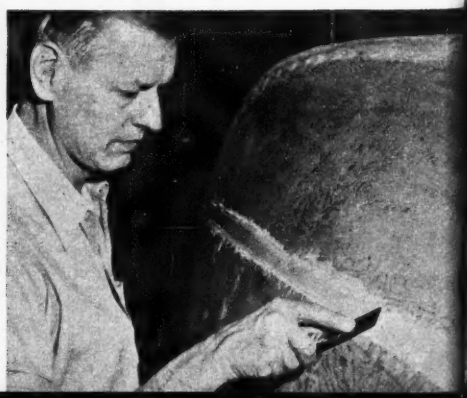
BOATS and BOATING

A Report On Fiberglas

When properly applied to a hull, glass cloth will endure for years and reduce spring maintenance to a brisk scrubbing.

SET ALL NAILS or screws just below surface; cover with solvent release filler.

MIXTURE of Weldwood glue and plasterer's Spackle makes excellent filler at joints.



By F. C. Clark

INSTEAD of scraping and painting the topsides and bottom this spring, how would you like to send the kids out with soap and water for a half hour's work? The answer of course, and you've heard this before, is Fiberglas.

Probably nothing that has been introduced to boatbuilding practice has caused more controversy than the application of glass cloth and polyester resin to hulls. Five years ago, when my neighbor and I decided to glass, we had more than a few misgivings. We read that the stuff was practically indestructible, but one of our leading boatyards told us we'd both need new bottoms inside of a year if we Fiberglased. Some who had tried it said it was easy to apply while others swore that it was impossible to do a decent job.

As with most extreme claims, we found the truth to lie somewhere between. Fiberglas is not indestructible, as we shall see later, but it does give the boat a finish that is hard as nails and it definitely cuts down on hull maintenance. It is not easy to apply, yet the amateur can get a glossy finish that is not only beautiful but stays that way all through the season. As for the bottom rotting out, we've seen rot in only one hull out of dozens we've worked on in the years since we became the neighborhood experts.

There are two kinds of polyester, the sun cure and the chemical cure.

DON'T just lay the resin on as you would do with varnish, scrub it into the fibers.

WORK OVER every square inch to get good bond; the Fiberglas should be skin tight.

CLOTH MUST lie flush on a smooth surface, so round off all sharp edges with a rasp.

OVERLAP CLOTH at bow, chine, keel, stern, etc., to add strength, waterproof joints.

Both give equally good results, the only difference being in the way they harden. Sun cure is applied in the shade and remains soft until it is exposed to the ultraviolet rays of the sun. You can use this type in cold weather and you have lots of time to work it. However, coloring cannot be added because the pigment would block the sun's rays and prevent hardening.

The second and more popular type of resin is the chemical cure. This type hardens by the chemical action of the catalyst which is added just before it is applied. The hardening time depends on the temperature and the amount of catalyst added. You can add pigment to chemical cure for permanent coloring and it is not necessary to move the boat in and out of the shade. However, you do need temperatures of at least 50 to 60 degrees Fahrenheit.

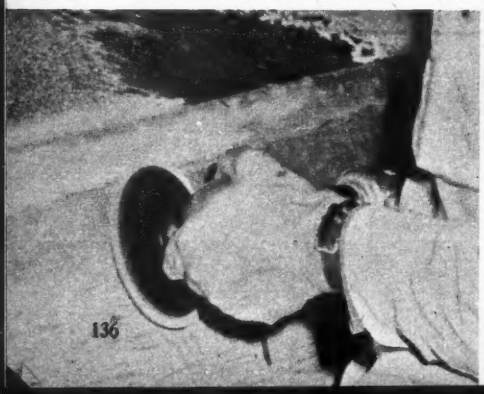
When buying materials for glassing, pick up large and small Pyrex measures, several small medicine bottles, a thermometer, scissors and a good bristle brush. (Nylon brushes dissolve in polyester resins.) Since the resin is quite sticky, get a brush that does not tend to shed. You'll also need a disc sanding attachment for your drill and a box of 50 floor sanding discs. The roughest you can get is the best for the job.

Misunderstanding and short cuts in preparing the hull probably account for more Fiberglas failures than anything else. Moisture, paint and oil prevent the cloth from sticking to the hull, so make sure that the boat is thoroughly dry and grind off any paint and oil spots with rough floor sanding grit before you start. New boats, too, should be abraded and roughed up so that the pores of the wood are opened. Essentially, the Fiberglas process is similar to a gluing operation. As all craftsmen know, the wood must be rough so that the adhesive (in this case the resin) can sink in and get a good grip on the fibers. When this is done, you can lay the cloth down skin tight and it will give you no further trouble. It is always best to remove keel moldings, chine guards and spray rails since it is almost impossible to do a good job around them. Usually they will have to be replaced with new wood. Sharp edges such as the chine or the keel should be rounded off with a plane or rasp. Concave joints such as those between bottom and keel should be filled to a gentle curve. A good filler material can be made from equal parts of Weldwood glue and plasterer's Spackle, with enough water to make a good trowelling consistency.

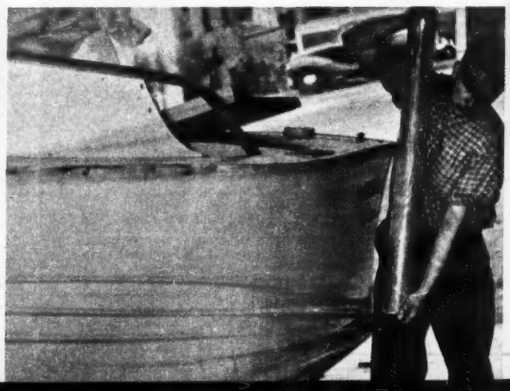
When you are ready to do the actual lamination, call out a few friends. While the hull is still dry, lay the glass cloth over it and fit it to each area you plan to cover. Then roll it up on a cardboard mailing tube and mark the section it fits. Measure the right amount of catalyst for pint batches of mix and put it in the little medicine bottles. Then, while working, you can simply dump a bottle into the resin, greatly lessening the chance of error.

When you apply the first coat of resin, don't just brush it on, drive it into the wood pores. It is best to use a batch with a slow setting time so that you will

FEATHER EDGES of lapped cloth with grinding wheel; also take out unbonded spots.



COVER HULL with a cellophane skin in preparation for the finish coat of resin.



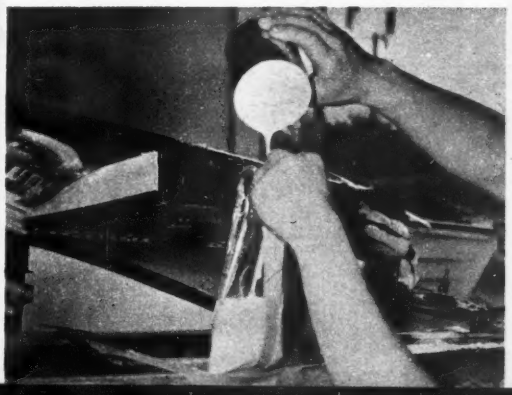
have time to work it in. When the resin has started to get tacky, have two of your friends hold the cardboard mailing tube over the hull while you take off cloth and press it down into the resin. If any bumps or ridges develop, lift the cloth, smooth it out and press it down again. You will find that you can do quite a lot to form and pull the cloth into position. If it will not go around some of the corners or curves, such as the bow, cut it and make it fit by removing excess cloth. As soon as the cloth is in place, get everyone busy rubbing it down. Be especially diligent around the keel, for the lamination shrinks when it sets and thus tends to pull away from any concave areas. When the first coat has set up sufficiently to anchor the cloth, brush another coat into and through the cloth so that it can bond with the first. Use clear resin for the first two coats, saving pigment until later. When the resin has set hard, usually overnight, go over it carefully for any blisters or places where the cloth pulled away. These will be nearly white, instead of the tan of the tight fit. Take the grinding wheel and grind out every one of the light spots. Grinding out a spot doesn't hurt the final job any more than boring a hole ruins the strength of a plywood panel. If the joint between the keel and bottom gives you trouble, cut it open with a sharp knife and pour resin into it. When it sets you will have a good hard joint. Plywood hulls over 16 ft. long should have two coats of cloth on the bottom and planked boats should have three; so you lay down another coat of resin, another layer of cloth and more resin, just as you did with the first course.

There are a number of ways to finish off Fiberglas. If you brush pigmented resin on, it will sag and run; a mohair paint roller used with the last coats of resin and pigment will usually turn out a bit smoother. If you don't mind a great deal of work, you can use Wetordry sandpaper and smooth the entire hull; this gives an attractive semi-gloss finish. You can also purchase polyesters which can be sprayed on or you can paint the hull, using some of the finishes especially compounded for use over Fiberglas. The best looking finish of all is that obtained by rolling the pigmented resin under a tight, smooth cellophane skin. For this, you tape a large sheet of cellophane to the hull, wetting and working it until you get it perfectly smooth. Then pour the resin between hull and cellophane and roll it with a photographic roller until it sets. When the polyester has cured, remove the cellophane, and you'll find an exceptionally hard, smooth, shiny surface.

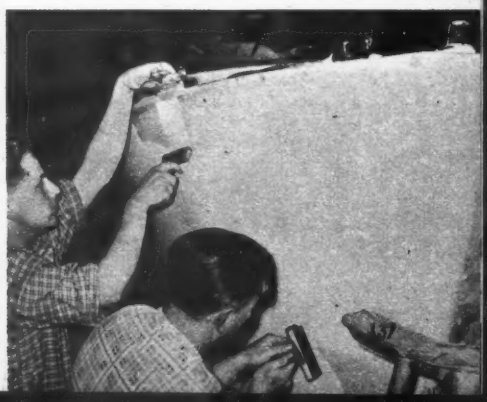
Our original treatment held up nicely for five years, taking quite a beating on and off trailers, beaching on sand and stranding on rocks. At the end of five years, both cruiser and runabout needed another coat of resin on the bottom. This was taken care of by the cellophane method mentioned above. For the years in between, we merely used a scrub brush in the spring. We have had no trouble with rot, leaks or plywood checks.

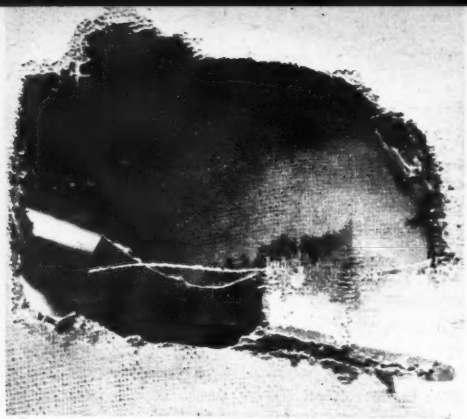
During a severe storm, the runabout was smashed against a dock piling and,

STRETCH CELLOPHANE smooth and then pour pigmented resin between it and hull.

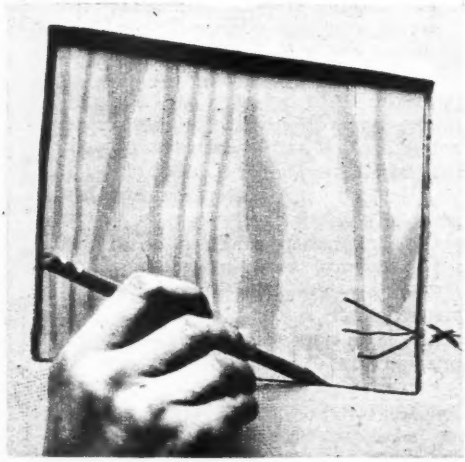


IT'S WELL to have two men to roll out the resin; it won't adhere to the cellophane.





FIBERGLAS adds lots of strength, but this hole was punched by a storm-driven piling.



DAMAGED SECTION is cut back to good wood and a plywood patch is carefully fitted.

PATCH and backing plate glued in, surface is roughed up for the layer of Fiberglas.

as one would expect, stove in. The repair was simple and effective. First the damaged section was cut back to solid, uninjured wood. Then a patch of the same plywood was fitted to the hole. A plywood backing piece overlapping the hole several inches was glued and screwed to the patch and both were attached to the hull. On the outside, the Fiberglas was cut back several inches from the edges of the patch and the edges feathered. Then the outside was Fiberglased, just as the original hull had been. When the color had faded in, the repair was imperceptible.

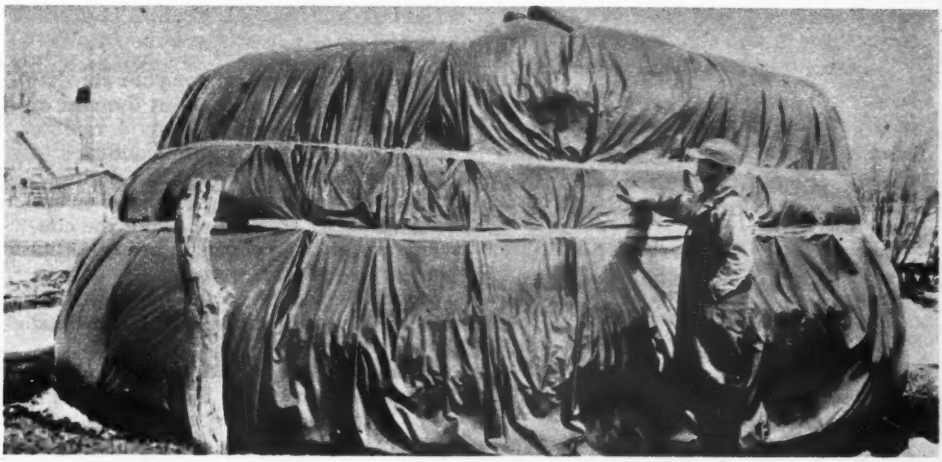
Yes, after five years we are thoroughly sold on glass. True, its initial cost is greater than paint and care must be taken in the application; however, if we consider the fact that it has to be done only once in five years, it becomes more than worthwhile. This is a job for the professional lazy man—the guy who will work like the devil for a short time so he can lay in the sun for a long time after. You have to use only a little care to insure a good bond. If you get any delaminations, just get the grinding wheel working and cut them out. You can have almost complete freedom from leaks in hull, decks and cabin and a boat that is much easier to maintain if you make that one major investment of time. It will also increase performance by reducing the tendency to waterlog and pick up weight toward the middle of the season. Fiberglas should be good for almost any boat to which it is applied, but for plywood boats, particularly those which spend time out of the water on trailers, it's hard to beat. •

RESIN tends to sag, so spread finish coat thin and apply a second coat if necessary.

The Farmer's Page

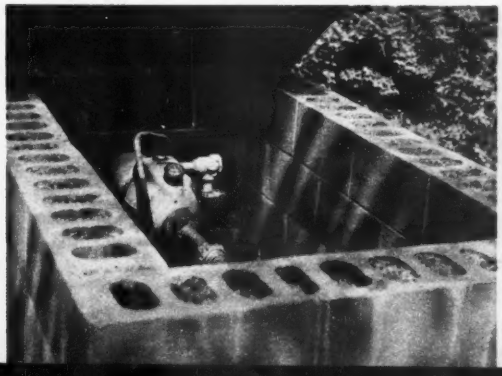
WHEN TRANSPLANTING young tree, wrap the limbs in burlap, making it easier to dig up and less subject to damage.

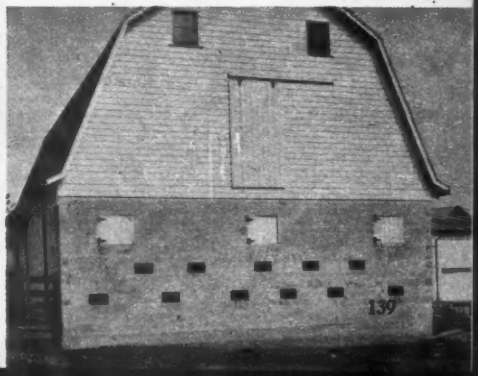
LOW-COST PLASTIC SILOS sold by Bob Stone Cordage Co., Chariton, Iowa, can be had in 35- or 70-ton capacity.

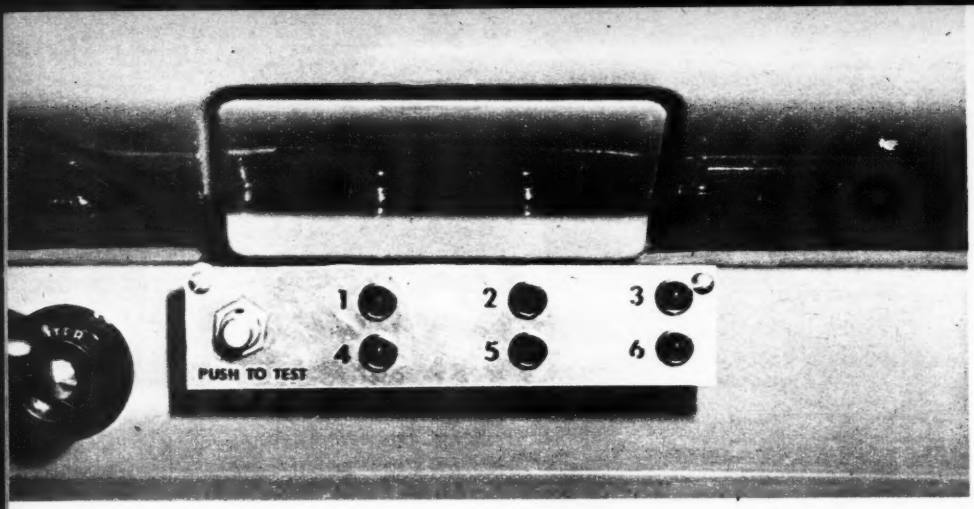


WATER PUMP and tank enclosure built of cement block filled with mica insulation, has an insulated cover, prevents freezing.

WET CORN won't spoil when stored in this ventilated crib. Cement blocks were left out and iron gratings put in their place.





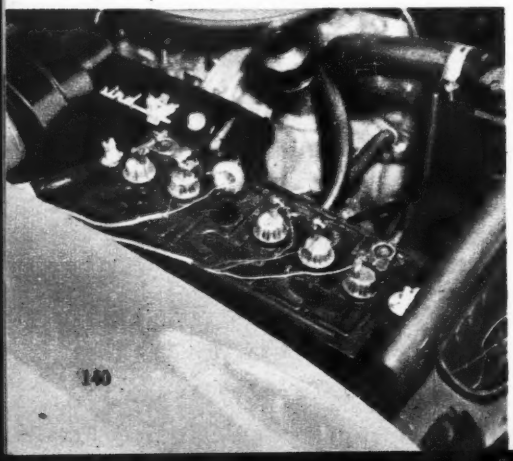


Dashboard Battery Tester

With this instrument you can check your battery's condition right from the driver's seat.

By John R. Stone

Close-up of 12 volt battery shows carbon rods inserted through enlarged breather holes.



HERE is one "extra" for your car that you can have for about the cost of a carton of cigarettes. It is a remote indicator that tells you the condition of your car battery without your having to get out of the car, open the hood or unscrew the battery caps. Besides the convenience, it has proven to be worth its weight in gold, and batteries, by being a constant reminder to the motorist that he has a battery in the car which must be cared for.

The indicator is adaptable to cars equipped with either 6 or 12 volt systems. Operation of the indicator is very simple; merely press a button on the dashboard and three lights (six if a 12 volt system) appear on the indicator showing the exact condition of each cell in your battery. If you have a healthy, fully charged battery the indicator lights (one for each cell in the battery) will burn brightly when the button is pressed. However, if the electrolyte (water) in the battery is below safe operating level in one of the cells the light controlling this cell will not light. Likewise, if the charge in any portion of the battery is low the light controlling this portion will burn dimly or possibly not at all if the charge is very low. It's

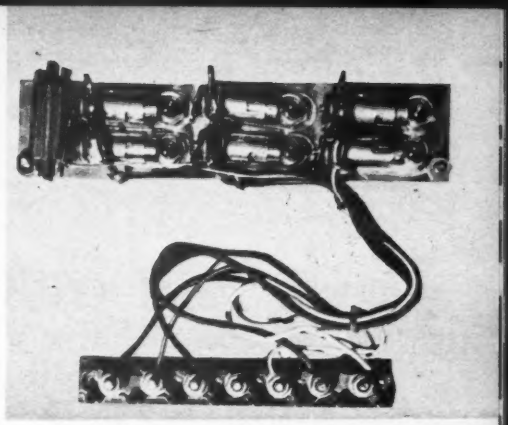
as simple as that and the test can be made at any time while standing still or moving.

Construction of the indicator requires only a few hours time. No electronic or electrical experience is required since all wiring is clean and straightforward involving no trick circuity.

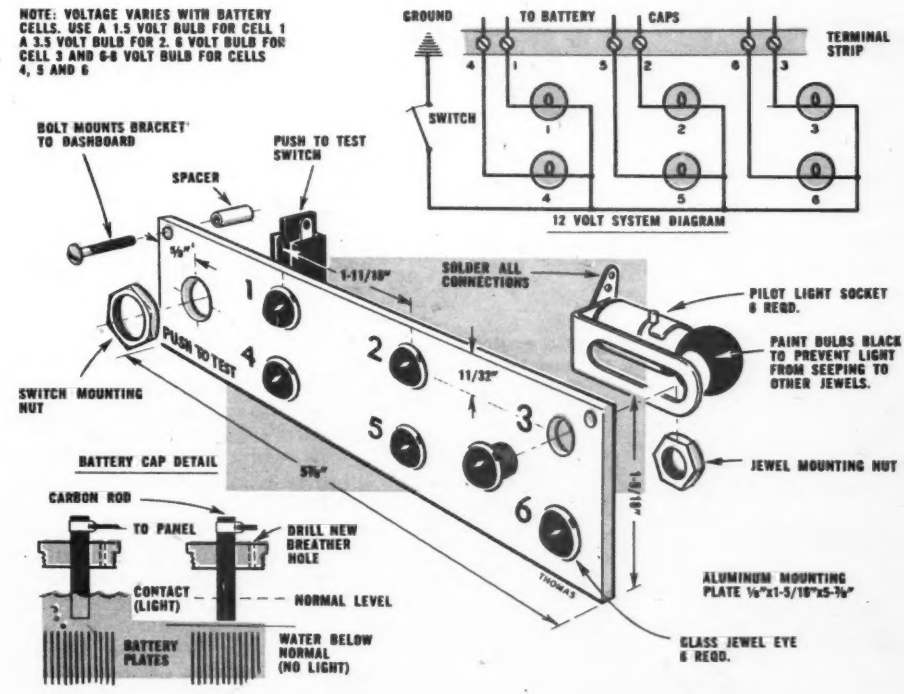
For the control panel we used a piece of scrap aluminum $1\frac{5}{16}$x5⅞-in. mainly because it was readily available, however, you may vary the size or shape to suit your own specific dashboard. The layout for the press-to-test switch and the six indicator lights is shown in the drawing. One side of the press-to-test switch is wired directly to ground. This can be the control panel which is later attached to the dashboard.

Do not use any other than a press-to-test switch because if a regular on-off switch is used and if it should inadvertently be left in the "on" position it could run the battery down due to the constant drain through the indicator lights. Also, be sure that a good, clean connection is made when attaching the control panel to the dashboard since this connection is a part of the circuit.

Solder a piece of ordinary hook-up wire to the other side of the switch and run this wire to one of the lugs on the first light [*Continued on page* 185]



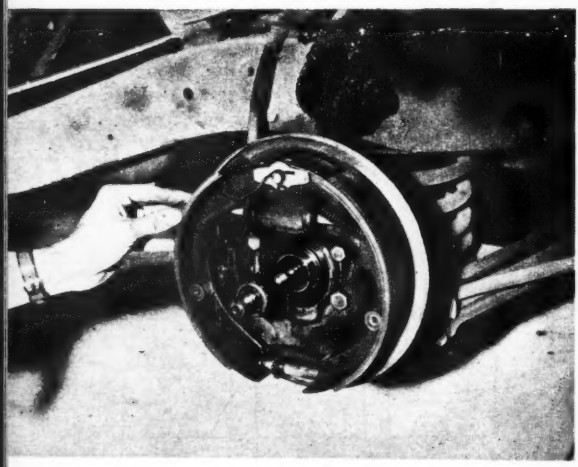
Back of indicator panel shows bulbs and wiring to the six-connection terminal strip.



CAR CARE

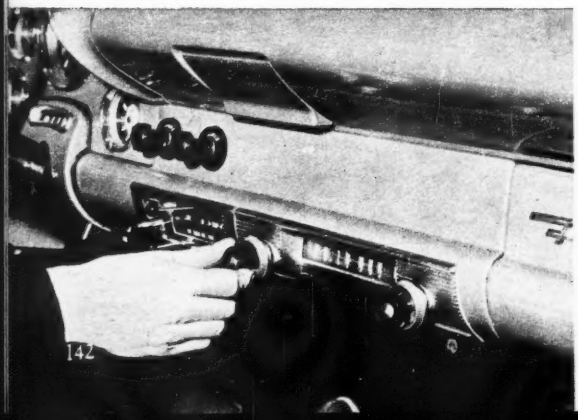
By Frederick C. Russell
Member, Society of Automotive Engineers

Is Your Mechanic Giving You Your Money's Worth?



Brake drums are thinner after they are trued. Try to avoid sudden "panic" stops.

Keeping radio on while cranking the engine will cause serious damage to most tubes.



MANY a repair job turns out to be a dud because *you* didn't take care of your car *after* it left the shop. It takes a lot of special handling to make a success of certain kinds of service. In many cases repairs are not finished when the car rolls out of the shop. The way you treat your car after repairs, determines whether you will be able to avoid repetition of the original trouble.

When a friend of mine drove off with a complete set of new brake linings he thought he was all set for at least 30,000 miles of good stopping. But down the street he decided to see what his money had bought. He jammed on the brakes for an unusually spectacular panic stop. The rest of the way home was not so satisfactory. Every time he slowed down, there was a decided pull to the right. Back at the shop Joe found that the left front brake wasn't working at all because its brake pistons had jammed as a result of excessive pressure.

This won't be the penalty in every case. The fellow fresh from an appendectomy won't necessarily get a pain in the stomach if he eats a piece of apple pie, but the surgeon will send him home with a few suggestions for a sane diet. After brake drums have been trued (a pretty word for the process of cutting off some of the stock from the inside of the drums)

they are a little thinner. Just how much this will weaken a drum depends on how husky it was to begin with and how badly it had been warped. The very fact that trued drums have been cut down should be a tip to the owner to go easy on his brakes. But, he gets nothing but a repair bill when he exits from the shop. So without specific instructions he is likely to indulge in heavy braking until he re-warps the drums. The finale usually is replacing the drums with new ones.

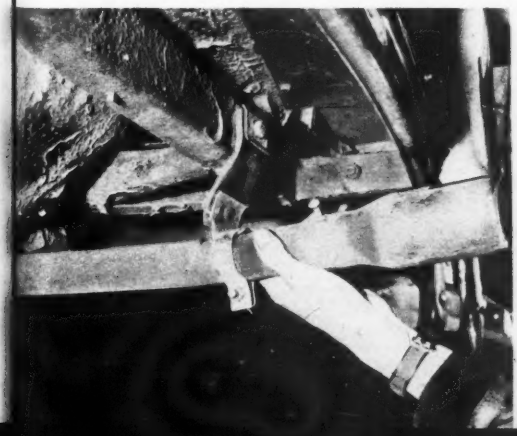
A perfect example of need for follow-up guidance is replacement of a worn and noisy water pump. If you will put a soluble oil rust inhibitor in the cooling system the new pump will be internally lubricated. Pumps so favored seem to have a life as long as the car itself.

There is no use beefing about having to replace the fuel pump, but the way to insure yourself against having to do the work all over again is to remember that what works havoc with the pump's diaphragm is high speed in very hot weather. Many a pump that would go all winter in the north will go to pot shortly after the tourist starts opening her up in the south.

Some repairmen take the time to explain things when they take your check. And some owners listen when the mechanic makes a few comments as they prepare to drive away. I am reminded of the time my neighbor had a new muffler installed. As he paid the bill, Joe explained: "If you hear any rattling under the car come back and we'll tighten the tailpipe hangers. This may not show up for a few days, otherwise I could check it now."

This is good business for all concerned. It's like the mechanic who in-

After muffler replacement, check tailpipe hangers to see if they need tightening.



Add soluble rust inhibitor to radiator as an internal lubricator for the water pump.

stalled a new engine in a customer's old car. "Bill," he warned, "this new motor has more horses under the hood. That means more heat, and since the old radiator ain't what she used to be we may have to nip you for a new and larger one. But maybe you can hold speed down and so avoid overheating. After all, you bought the engine because the old one had become an oil and gas hog and was rapping itself to pieces. You didn't spend your money for performance. Keep this motor from pinging by using higher octane gas, make sure the clutch doesn't slip, keep tire pressures up and watch lubrication closely."

The follow-up on repairs is just as necessary for minor service. Take replacement of breaker points. The usual caper is to set the new points, checking cam angle and sending the car owner away with a cheer. A couple of weeks later the engine seems to have lost some of its zip, but the owner doesn't know that because there has been some initial wear on the rubbing block of the breaker arm, the points have less gap and timing has been altered as a result. Going back to the shop for a re-check adds to the expense of this operation but it pays off in terms of improved performance.

Most motorists believe that ignition timing is regulated entirely by the position of the distributor's body and has nothing to do with the gap between breaker points. Another exhibit is the way a clutch will continue to grab after its pressure plate has been replaced, both owner and repairer overlooking the possibility that chatter can be checked with a motor tune-up. We may even lose sight of the simple fact that too slow idling will cause rough clutching. Also, a loose tailpipe assembly will sound like clutch chatter.

When you complain about hydraulic valve lifter noise they may or may not tell you what you should do in addition to making sure the engine has clean oil. Sometimes there is trouble with the lifters themselves such as gummy deposits, leakage or wear, but in numerous cases lifters become noisy because of sticking valves. Exhaust valves are the usual trouble-makers because they operate hotter. To prevent a recurrence of lifter noise, use a detergent oil and avoid cold, short runs. The oil should be kept clean with the aid of filters and frequent changes.

What every motorist wants to know when he leaves a repair shop is how he can avoid having to come back again with the same trouble. It calls for a chat with the mechanic who did the work. When a friend of mine had a new set of piston rings installed in the engine of his new car, he was warned not to drive the car too slowly. His habit of babying the car is what prevented the original rings from seating properly.

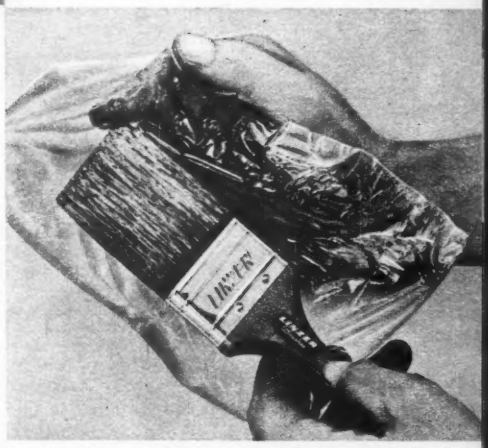
When one customer paid the bill for new pistons, the mechanic who did the job warned him against allowing the engine to ping on hills and during acceleration. In this particular case a piston broke because [*Continued on page* 158]

After universal joints have been replaced, inspect for looseness of drive shaft joints.

Several weeks after replacing breaker points, check to see that you have the correct gap.

WALL tiles made of vinyl are available in 10-inch squares in various colors. Laminated Plas-Tex, 1427 North St., Springfield, Ohio.

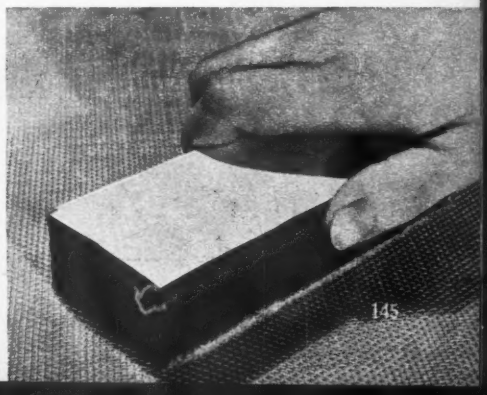
FRESH PAINT TIPS



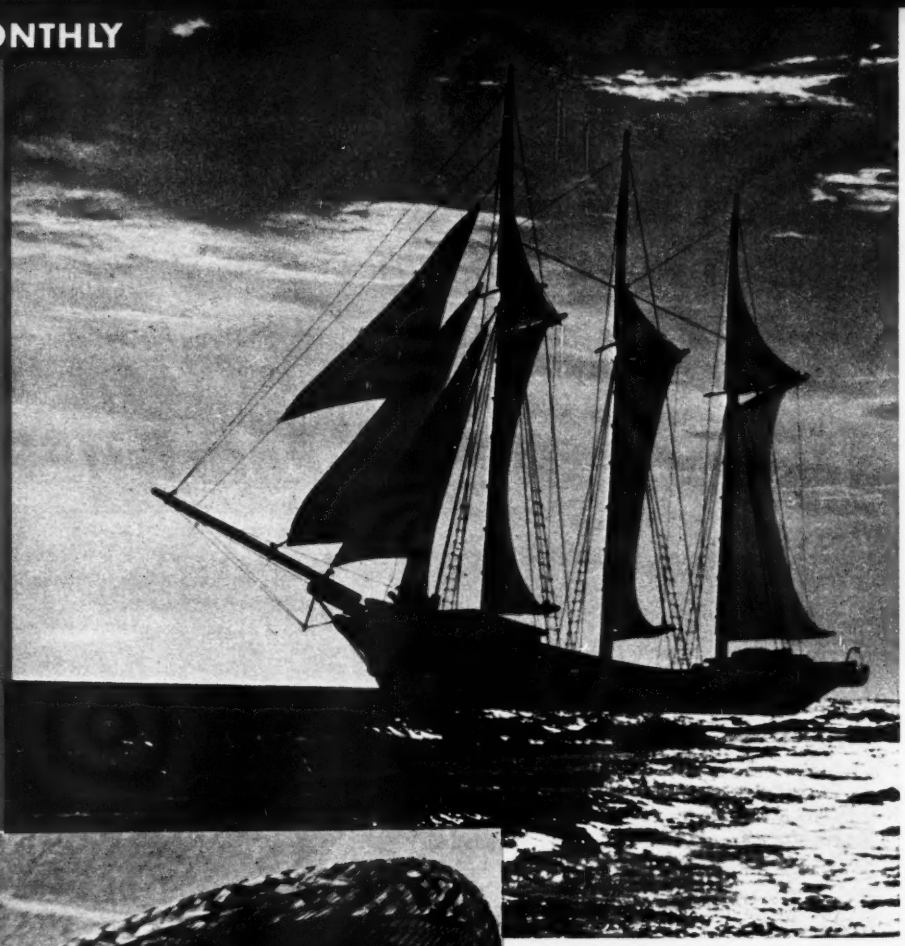
NO NEED to clean your brush between first and subsequent coats; merely wrap bristles in Saran wrap. Brush will remain pliable and ready for use.

FABRIC dyes can be used instead of wood stain to get interesting and different effect. Try out on scrap first to get proper shade.

WINDOW screens are painted quickly and without clogging up the fine mesh if you use a blackboard eraser as paint spreader.



MONTHLY PHOTO CONTEST



1st Prize ($25) .....Homeward
Jim Larkin of Birmingham, Ala. used two 35mm negatives for this montage.

$10 Award .....Barefoot Boy With Gap
Taken by Cliff Murray of Garden Grove, Calif. with a 2¼x3¼ Graphic on Plus X film; 1/50th at stop f-16.

Please put your name, address and picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope or postage for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Please address your entries to: Photo Contest, *Mechanix Illustrated*, 67 W. 44th St., N.Y.C. 36

$10 Award .....**Another Roundup**
Peter Klawson of Kalamazoo used a 4x5 Graphic; G filter, 1/100 at f-22.

$10 Award .....**Orphan**
By Harvey Colpe of Alexandria, Va. Exakta at f-22 and 1/250th; Plus X film.

PHOTOGRAPHY TODAY

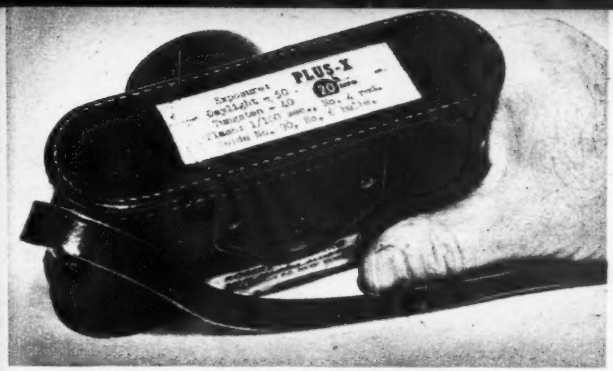
- ***The Hershey "700" Speed Flash***
- ***The Nomad Camera***

NOMAD camera takes eight pictures on a 127 roll. With flash, $7.45.

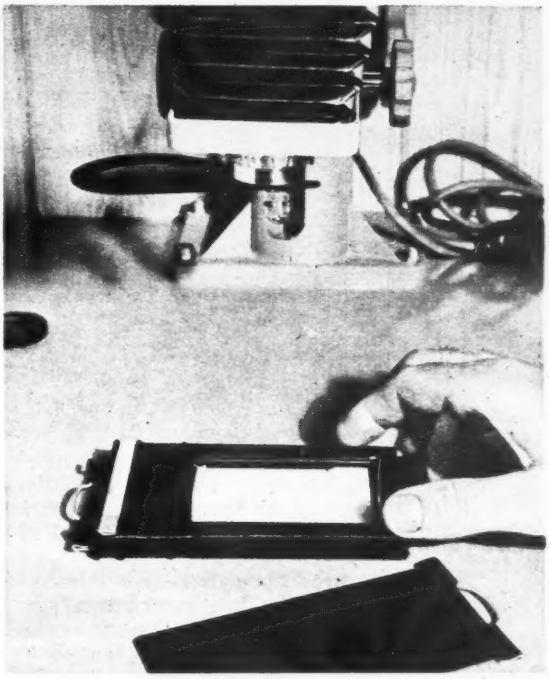
IF you have ever run out of flash bulbs in the middle of a picture-taking spree, you will appreciate the convenience of "strobe" or speed lighting. The newest speed flash on the market is the Hershey "700." It combines AC operation for indoor use and battery operation outdoors or in places where alternating current is not available. Four size D batteries power the unit and will deliver at least 200 flashes. Re-cycling takes about five seconds and "ready" is indicated by means of a neon light in back of the flash head.

Flash duration is approximately 1/1000th of a second and the guide number for Kodachrome is 40. For Ektachrome and Anscochrome film, it is 70. For example, if your camera is loaded with Kodachrome film, divide the distance from the subject to the camera, say ten feet, into the guide number 40. The correct stop to use [*Continued on page* 158]

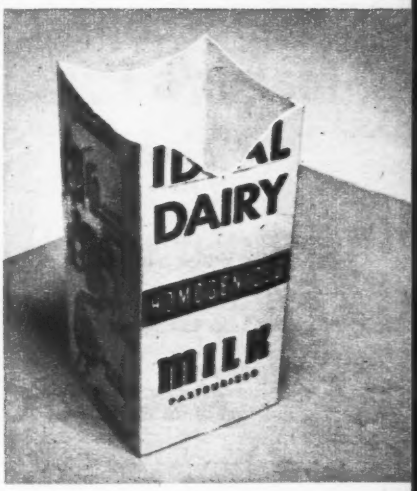
PHOTO TIPS

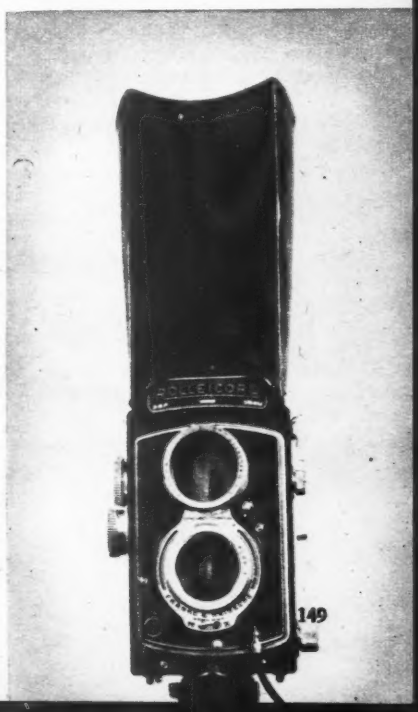


GOOD WAY to keep track of what film you have in camera is to tape card bearing exposure data to case.

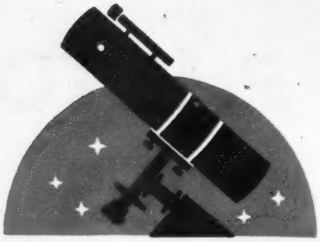


USE CUT FILM HOLDER as easel when making copy negative from 35mm transparency. Focus on white paper in darkness, insert panchromatic film, emulsion side up.





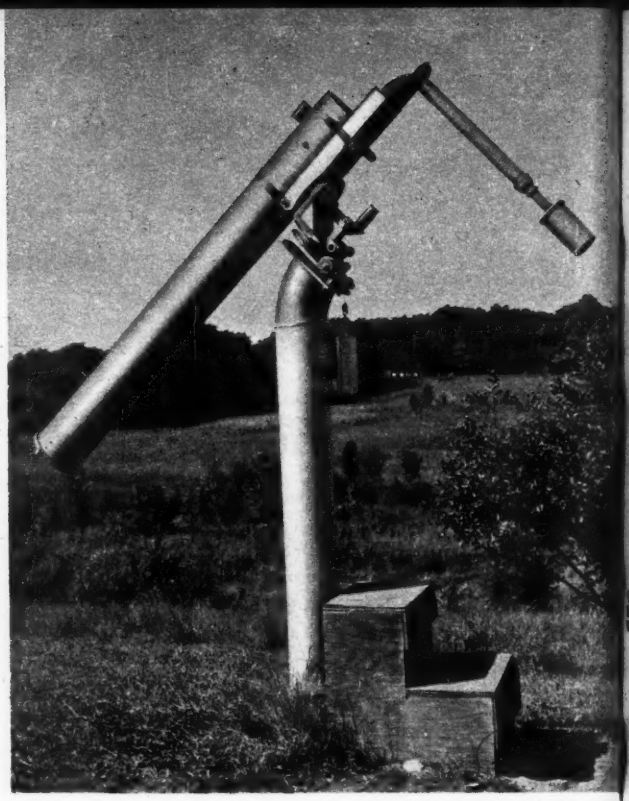
HOOD EXTENSION for twin-lens reflex is made from milk container. Remove wax with benzine, shape ends, fold edges and paint a flat black.



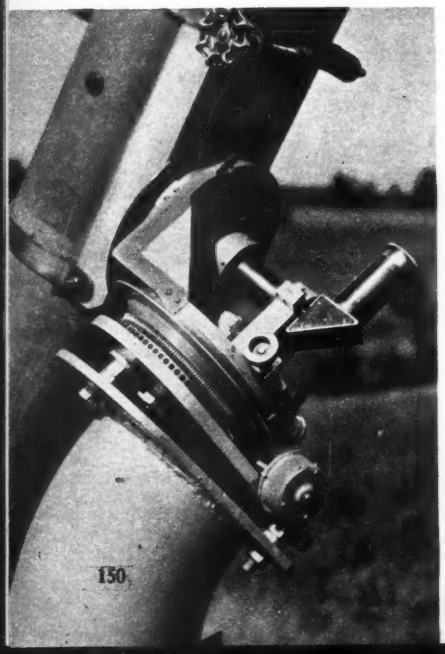
The Amateur Telescope Maker's Page

Conducted by Robert Brightman

In a Springfield type of mounting, the entire telescope revolves around the eyepiece. This means that the observer can remain in a comfortable sitting or standing position while viewing. This comfort and convenience is gained at the cost of an extra prism.



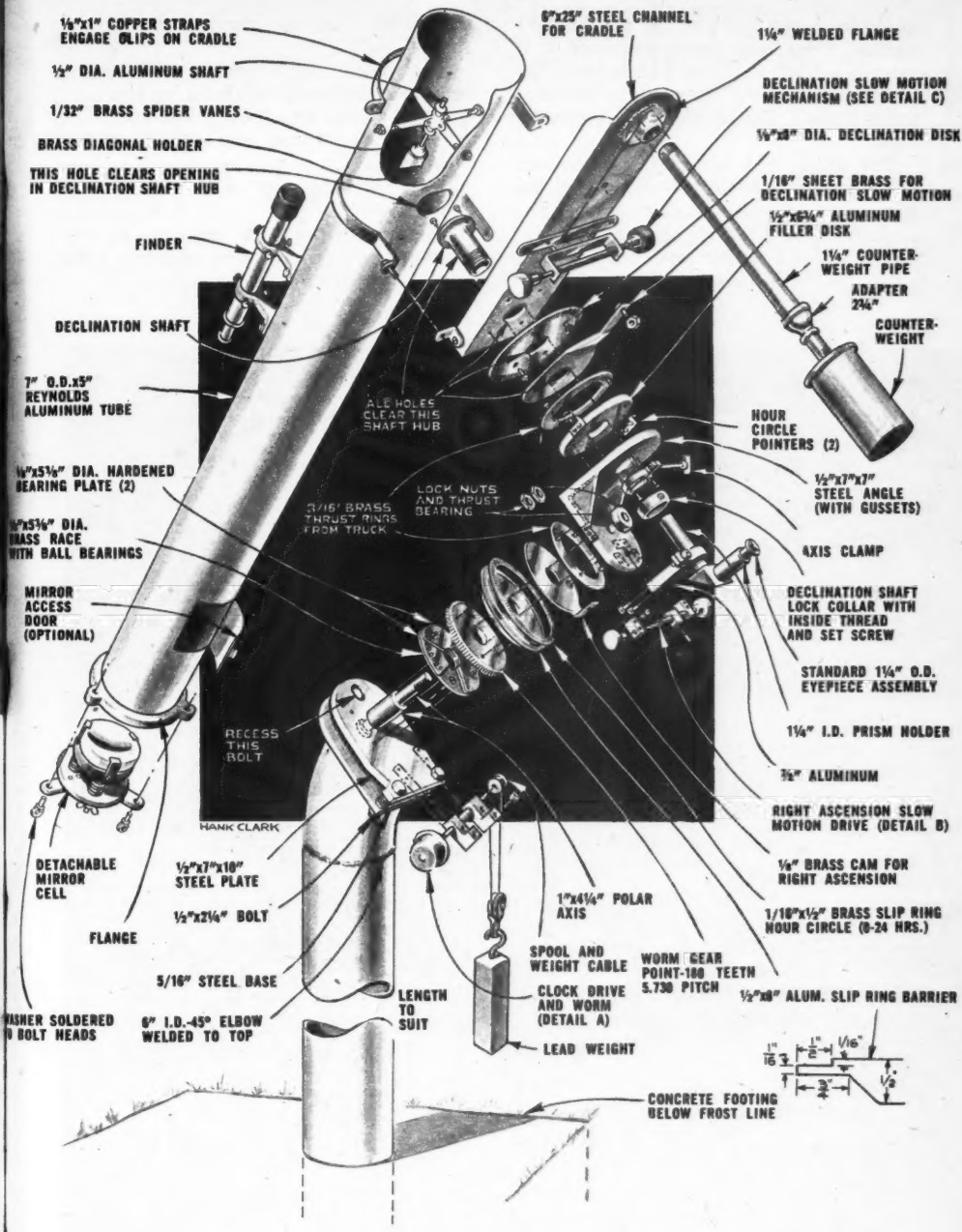
A SPRINGFIELD MOUNTING



IF you have become fed up with climbing all around the eyepiece of your Newtonion-type telescope, try building this Springfield mounting, as originally designed by Russell W. Porter.

The heart of the Springfield-type telescope consists of a piece of 7x7x½-in. structural steel angle reinforced with gussets. The corners are rounded to a 3½-in. radius for appearance's sake. The backs were faced off to a true 90° angle. The saddle consists of a 24-in. length of a six-inch steel channel with a hole drilled to take the hollow declination shaft. This saddle extends past the open end of the tube to take a 1¼-in. pipe which holds the counterweight. There is enough distance between this pipe and the eyepiece to provide clearance for the observer's head when the tube is pointed toward the northern sky.

Bearing surfaces consists of two thrust rings, seven inches in outside diameter and $\frac{3}{16}$ in. thick, mounted with countersunk brass bolts. These rings were lapped together with a grind-



ing compound, one against the back face of the angle and the other against a faced-off half-inch thick base plate. This in turn holds a ¾-in. bolt on the polar axis.

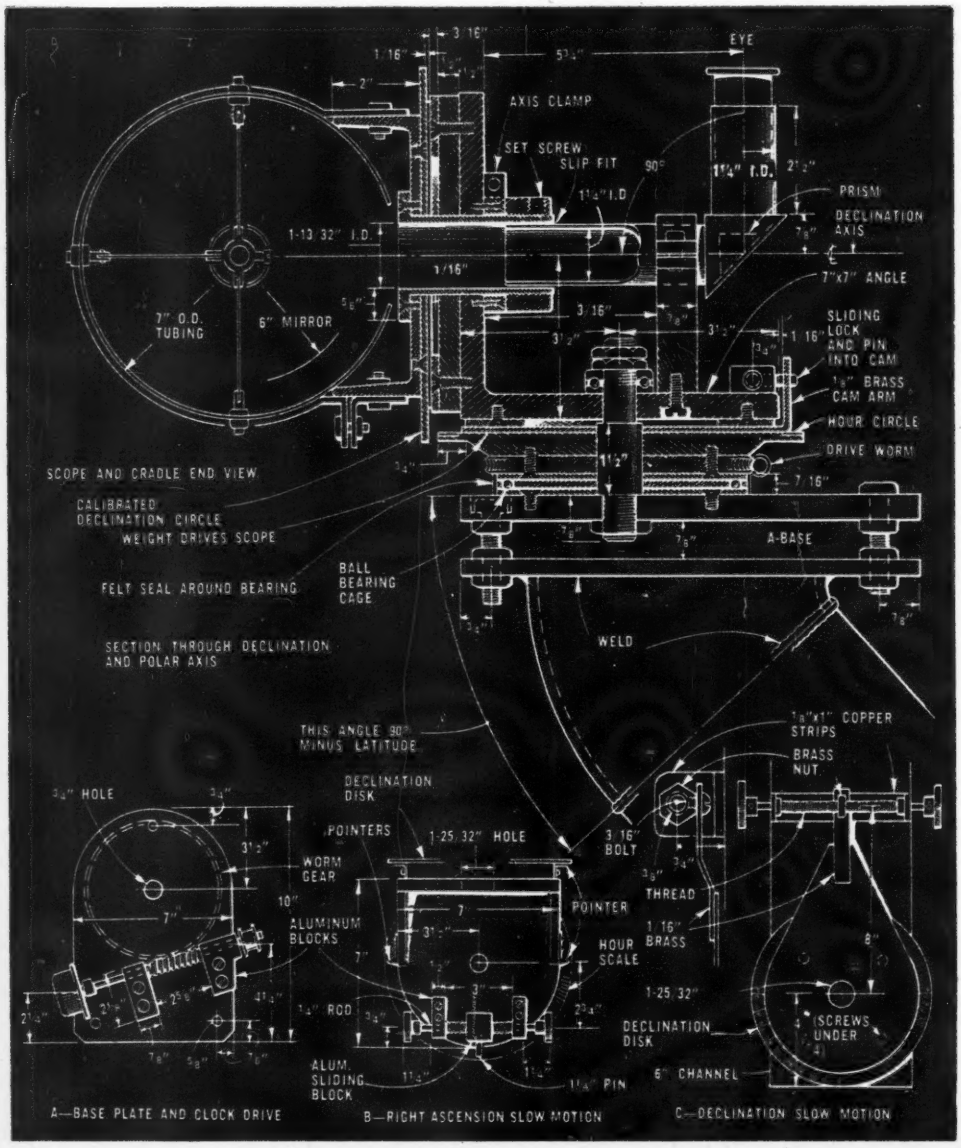
The slow motions are flat cam-shaped sheets of brass inserted between the declination and right ascension bearing surfaces. This permits swinging the tube to any [*Continued on page* 152]

angle by hand and picking up the slow motion from any point, because it is merely a friction drive which turns the telescope. The 90° eyepiece holder was made from a 1¼-in. hard copper water pipe.

The tube is a standard seven-inch aluminum irrigation tube made by the Reynolds Aluminum Company. The pedestal is a six-inch pipe with a 45° elbow welded to the top. It ends in a 750-pound concrete footing, buried in the ground.

The clock drive which was added later was designed and built by Richard Foltz of South Bend, Ind. It consists of a worm wheel and worm. The brass slip-ring right ascension circle is machined into the top of the aluminum worm wheel.

To operate, point the telescope to any known star, [*Continued on page* 190]



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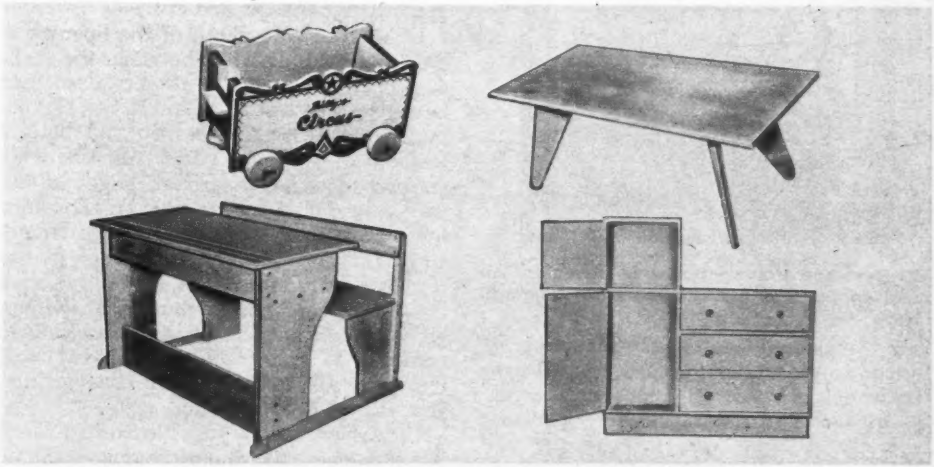

Upper left: 14" long circus wagon; **upper right:** 40" long rectangular coffee table; **lower left:** play-school bench; **lower right:** 53" high wardrobe-chest of drawers.

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LOOK FOR THIS LABEL!

Hideaway Ironing Board

[*Continued from page* 109]

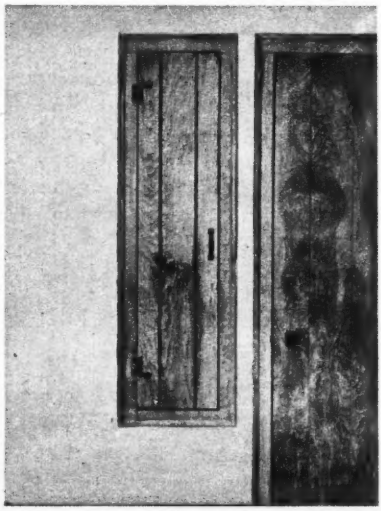
The plywood ironing board is bolted to the metal support and tightened with one wing nut.

(12x44-in.) may require a supporting leg hinged to the underside of the panel near the front end.

Key factor in the design and operation is a sturdy metal hinged support unit which is installed under the ironing board panel. The panel is fastened to this metal undercarriage by one bolt which permits it to be swiveled back and forth to any horizontal position when lowered for use.

The hide-away unit described here is placed between two parallel wall studs erected on 16-in. centers. Where wall space is not a restricting factor, choose two adjacent studs nearest to the desired location and keep in mind that an electrical outlet for the iron should be available close to it. When the unit is built into an existing home, locate the studs, mark off the opening dimensions and cut.

The finished unit, when closed, presents a harmonizing picture with the rest of the room.



In all cases the depth of the opening is limited to the distance between the front and back walls. The project described here uses vertical side panels, ¾x4⅜x66-in., and ¾x4⅜x12⅞-in. top and bottom frame panels. These panels must be wide enough to cover the rough edges of the wall material and studs, plus an allowance for a section of ⅜'s nailed to the framework. The procedure here is to fit the framework into the rough opening, remove the sections and nail the butted corners together; then cut the plywood backing to conform to the framework and fasten. Next, install the carriage in the position shown in the photograph.

Unless you have a suitable ironing board panel on hand, board dimensions should be determined by measuring the amount of available space. Transfer these figures to a piece of ¾-in. thick plywood and allow enough additional room between the panel edges and the opening framework for the board's padding. If you want to, you can buy the ironing board with the metal carriage already attached, from L. H. Eubank, 433 W. Florence Ave., Inglewood, Calif.

The kind of material to use for the door and the finished treatment should match the rest of the woodwork in the room. Cut the vertical and horizontal trim sections to size and nail. Be sure to set the boards back ¼-in. from the inner face of the opening framework. This will provide a ready-made door stop, should one be needed, and improves the over-all appearance.

The metal safety rack for storing your hot iron can be made of sheet metal (see drawing). To provide a convenient resting place for your iron when in use, fasten a metal safety pad near the back top edge of the ironing board panel. Cut a piece of asbestos to fit under the metal plate and tack the two pieces over the swivel-bolt head. When attaching an ironing pad over the panel, do not cover this metal plate. •

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How To Tap A Phone

[*Continued from page* 108]

the amplifier draws 25 to 35 milliamperes only when there is a signal, the battery will give many hours of use before it needs replacing.

The first step in construction is to drill the holes to mount the chassis and the speaker in the meter case. Remove the decorative moulding on the front of the case. The two holes under the moulding must be drilled or reamed to a half-inch so that the nuts on the volume control and the jack will fit snugly and serve to support the front of the chassis. The case is made of light steel and no trouble in drilling the holes will be encountered if a sharp drill is used. Punch a slight indentation before the hole is started.

Since the amplifier is built in a fairly large case, there is plenty of space for a chassis that will hold all the parts without crowding. An unusual feature is that everything is attached to the chassis. This includes the input jack, the volume control and the battery.

By removing the two nuts holding the brackets in the back, the chassis can be removed intact for servicing.

Before construction of the chassis can be started, the mounting holes for the battery holder, transformers and brackets must be drilled. Using the photo and drawing of the chassis as a guide, lay out the transformers on the chassis and drill holes with a No. 30 drill. The same size holes should be made for the battery holder and brackets; the jack and volume control are mounted under the chassis. Make sure that the brackets for these parts are positioned carefully so that the nut on the volume control and the jack will match up with the two holes in the front of the case.

Next, mount the parts on the chassis. The first stage of the amplifier is mounted at the front of the chassis and the other two follow along the side with the push-pull stage being at the back. Flea clips are used to hold the transistors; they also act as binding posts. As a result, the usual rectangular holes for sockets do not have to be drilled. Three clips are used for each transistor. Mark the flea clip that holds the collector (C) of each transistor with a spot of red nail polish or paint so that you will be sure to connect the transistor with its proper polarity.

Insert the leads of the components into the holes in the chassis. Bend them slightly so they will stay in place. Now you can begin the soldering. Check the schematic carefully as you perform this operation. Be sure that the color coding on the leads of the transformer are correct to avoid oscillation. Another cause of oscillation is neglecting to ground the black lead on the output transformer. Solder this wire to a ground on the chassis and run a wire from there to the speaker. A solder joint on the frame of the speaker will *not* work. Check also for correct polarity on the electrolytic condensers.

Before testing the amplifier go over the schematic again to be sure that all connections are correct. A few minutes spent checking at this time may save you the trouble of later replacing a transistor.

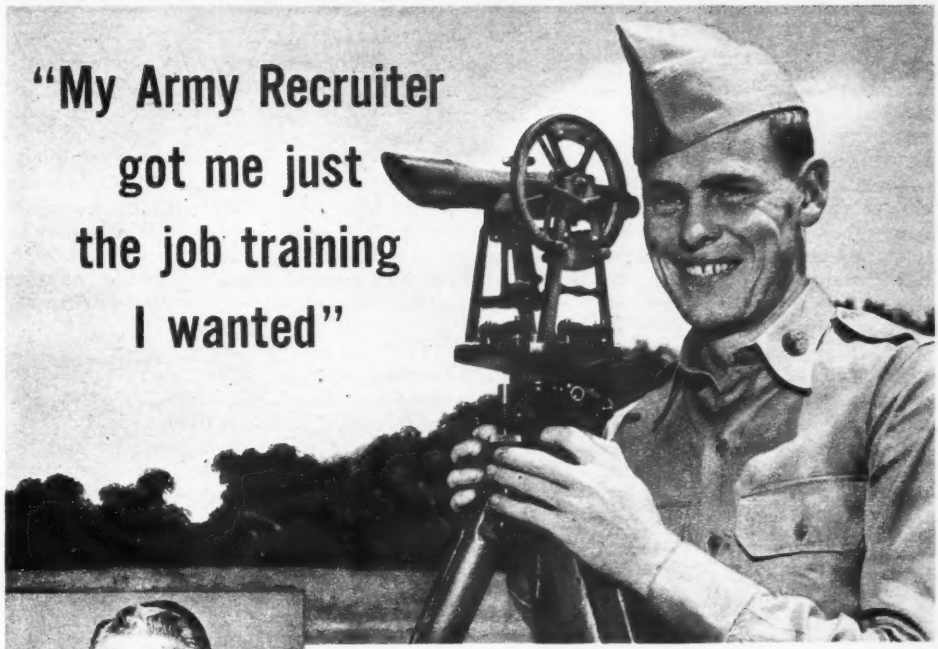
Slide the chassis into the case so that the nuts pass through the holes in the front and support the chassis. Hold the chassis level and drill two holes for the bolts that will pass through the brackets in the back. Now remove the chassis and insert the transistors in the flea clips, making sure that the collector side is next to the red dot. When you clip the leads of the transistors, leave them a little long; this may save you trouble later. Put the battery into its holder and put on its snaps.

Insert the speaker and grille cloth. Now, install the chassis and bolt it in place. Solder the two leads from the speaker to the two flea clip binding posts on the rear of the chassis. Leave a little slack in these wires so that the chassis can be removed without unsoldering.

Solder the shielded cable from the phone pickup to the miniature plug. The inside wire goes to the short side of the plug, the braided part to the long part. Now the unit is ready to be tested.

Turn the amplifier on. If the unit is functioning correctly, the only sound from the speaker will be the normal hiss generated by the transistors. If the unit oscillates, check the ground on the input, the volume control and the output. If it still oscillates, check the leads on the trans-

[*Continued on page* 177]



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Army Recruiter
San Francisco, California

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Pvt. John R. Fox
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Get choice, not chance, from your Army Recruiter

Is Your Mechanic Giving You Your Money's Worth?

[*Continued from page* 144]

of pinging from overheating, but it could have been caused by failure to use the rignt gas for the engine's condition and its timing. It is okay to use an advanced spark but this usually calls for a high-octane gas, especially if the cylinders are starting to collect carbon and if the car carries a heavy passenger load.

If the engine shows any signs of kicking back when you press the starter button, the timing is too far advanced. You can strip a tooth from the flywheel ring gear should the engine backfire during cranking. Over-advancing will also bring on rough idling. Don't let the automatic transmission fool you. It is a pretty smooth article and will seem to suggest that the engine is pulling easily when actually it is rough as a porcupine.

Some years ago the owner of a car that had just been greased was puzzled because the front wheels broke into quite a shimmy. Had an experienced mechanic done the greasing he would have seen that the kingpins on the car were loose, the new lube changing their position just enough to invite shimmy.

Listen to the case of a mechanic who warned the owner against applying the brakes while the car was going over a rough spot in the road. "That broken rear spring was due to overlooking this simple rule," he explained. "No use overloading the springs with braking torque at the very moment they are handling the stress of maximum flexing."

It also makes sense to be told that the brakes will need a little wise use before they smooth out following relining. Many brakes need to be used several times to "condition" their linings when first starting on the day's run. A damp garage will cause brakes to bind until the moisture has been driven out.

Because we unconsciously change our driving habits to compensate for car troubles, it is important to discard these tricks after repairs have been made. Clutch work illustrates this. One owner got into the habit of kicking way down on the pedal for every shift. This was not necessary when the clutch was overhauled; in fact, this would have handicapped it.

After changing the shift locks (detents) in the transmission, thus checking a bad case of slipping out of gear, one mechanic explained to his customers that while the work would curb most of the transmission's tendency to go back to neutral of its own accord, there would be other conditions that would encourage it to misbehave. One was carrying the rear tire under too high pressure. When rear wheels dance on a rough downgrade there often is enough shock to the driveline to shake the transmission into neutral. Go downhill slowly if the road is rough.

Perhaps you've had to buy a new tube for the car's radio lately. But do you know that tubes can be killed by having the radio "on" while cranking the engine?

Did they tell you, when you had the brakes checked to solve fading, that you can meet this problem best by learning to apply the brakes firmly several times during a descent instead of pressing the pedal lightly but steadily? Fading is checked by avoiding long application which heats the drums and causes them to expand away from their shoes.

Get the facts when you drive out of the repair shop. It's the best insurance against having to play a return engagement. •

Photography Today

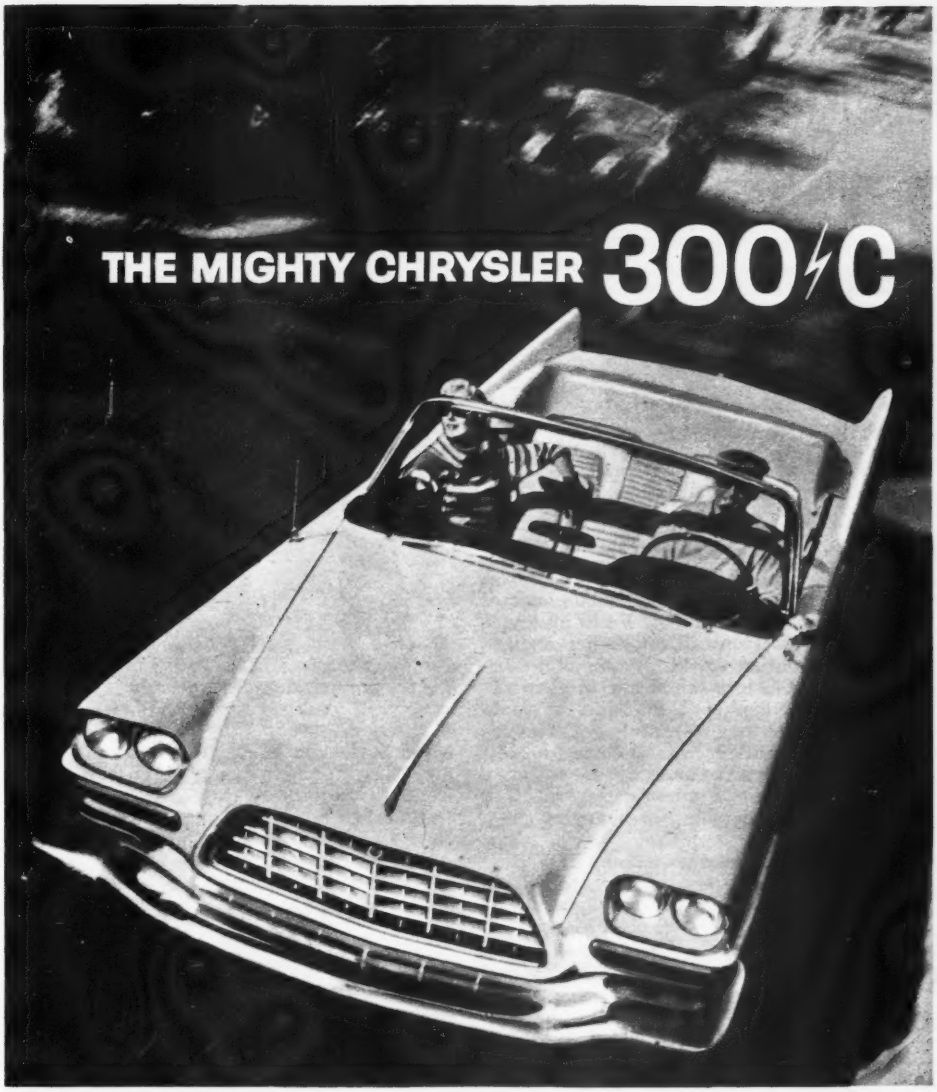
[*Continued from page* 148]

is then f-4. The unit, complete with extension bracket, AC connecting cord and carrying case sells for $54.95. It is made by the Hershey Manufacturing Company of Chicago.

The Nomad 127

This is an inexpensive brown plastic camera which delivers eight 1⅝x2½-in. pictures on a roll of 127 film. The camera, made by Sawyer's, Inc., of Portland, Oregon, sells complete with a detachable flash attachment for $7.45. The flash attachment is powered by two pen-light cells and is especially designed to take the new subminiature M2 flash bulbs. A good beginner's camera and a good second camera for photographers who can't be bothered or cannot remember to set shutter speeds, stop openings and change M and X settings. The camera has a fixed focus lens; shutter speed is about 1/30 of a second.

—*RB*



FOR SPORTS CAR THRILL . . . AND LIVING ROOM COMFORT

Here, freshly dressed and with more muscles than ever, is the newest version of the NASCAR Grand National Champion Car.

It is a tough, no-nonsense car. Its 375 horses pull one of the most rugged road chariots that ever burned up a track. It has the get-away, balance, and split-second control of an athlete. In short, all the thrills of the finest sports car.

But note that you don't have to be an acrobat to get in, a midget to be comfortable, or an Eskimo to keep warm. The Chrysler 300-C has all spacious comfort of any of the new Chrysler models, richly finished in sports-car leather. And it's now available in either convertible or hardtop models. See the Chrysler 300-C soon at your Chrysler dealer's.

America's Most Powerful Car—375 H.P.

MAIL FOR McCAHILL

Uncle Tom is sorry he can't answer all his mail personally. In this column he'll answer the most interesting letters. Write to him at MECHANIX ILLUSTRATED, 67 West 44 St., New York 36, N. Y.

● *I would like to know why engines cost so much.*

Jerry W. Lance
Carlsbad, N. M.

Actually, engines in American automobiles are among the finest industrial buys ever offered. All good American engines are capable of running better than 100,000 miles without major repair, if intelligently operated. Even our most expensive automobile engines rarely cost more than $700. From a service standpoint they'll outlast any other engines built in the entire world. Automobile expense today goes into the sleazy brightwork, can-quality bodies and whiz-kid appointments, plus what they call "styling." The engines are the real bargains. It costs a lot less to blow up and replace an entire engine than it would to repair a minor sideswipe that creased doors, fenders and overhanging gook.

● *Now that you've seen all the 1957 cars, bet you haven't guts enough to tell us which you think is the best-looking.*

Bob Anderson
Bridgeport, Conn.

My vote goes to Plymouth.

● *Enclosed is a clipping from the daily newspaper* France Soir *which called the New York Automobile Show "a mass of good-looking women surrrounded by metal monsters." It says the new American cars "resemble a drunk's dream fish" and the best things in the New York Auto Show were the leggy chorus girls in the show's musical review.*

George M. Kokinchak
Tucson, Ariz.

I challenge the Frenchmen (being the sporty group they are) to park any of our "metal monsters" outside Maxim's in Paris with the door open. Then park a Renault behind it and a Peugeot in front, both with their doors open. Then make book on which car the long-legged French gals would head for first. I know—I've been there in our "metal monsters."

● *Recently I bought a Potrzebie Eight but the furshlugginer veeblefeetzer cracked on me. What do you suggest I do?*

Arnold Folgman
Lincoln Park, Mich.

Change doctors.

● *The very day I read your article (1956 Carvalcade MI Dec. '56) I also read this. I think it answers your question.*

Phillip A. Haas
Evansville, Ind.

Mr. Haas sent me a clipping from my own article and a newspaper tear-out of a column by Dr. George W. Crane in The Evansville Press called Learn To Analyze Your Husband. In the '56 Carvalcade I stated that I knew a number of successful businessmen in their 60's who bought Chrysler 300B's because they were the fastest. I also said that these were not the young men you'd expect to buy such cars but sane, successful businessmen. I stated that if the National Safety Council had a headshrinker who knew the answer I'd like to hear about it. Dr. Crane wraps it up this way:

"But another type of husband is one who has scared himself into a platonic role, then uses his motor car as an indirect symbol of his own masculine vigor. As his erotic power wanes, he zooms his car with constantly faster speed. For men (and boys) with inferiority complexes usually crave a "whipping boy" in the form of a gasoline engine. Instead of writhing in self-accusation and belittling self-criticism, they project their ire upon the innocent auto and abuse it. So fast, reckless driving not only serves as a vague tonic for their wounded ego but also as a scapegoat for diverting their ire from themselves."

[*Continued on page* 162]

Name your test!

Here's solid proof

you can bank on new ACs...

for full-mileage efficiency!

Rush-hour traffic on Chicago's famed Michigan Avenue.

AC Spark Plugs are tested under traffic-crawl conditions in Chicago; 104° heat in Phoenix, Arizona; 20° below zero in Fairbanks, Alaska; 14,000 feet up on Pikes Peak; below sea level in Death Valley; and with 100% humidity in the Louisiana bayou country! In all these tests of starting, cruising, climbing and idling ability, ACs come through with flying colors.

Your car rates spark plugs that hold their full efficiency between changes—as recommended by your car's manufacturer. So, take the good advice of your AC retailer and install new AC Hot Tip Spark Plugs, engineered and super-tested for your kind of driving. You'll feel a smooth difference in power and pickup . . . notice fuel savings, too!

AC

hot tip spark plugs

NOTE: For most efficient operation, change spark plugs at least every 10,000 miles.

Watch WIDE WIDE WORLD NBC-TV

AC SPARK PLUG THE ELECTRONICS DIVISION OF GENERAL MOTORS

3 Weldwood® Wizards for the perfect finishing touch!

Whether you prefer the light blond finish, deep mahogany or a painted job, insure the effect you want with a Weldwood finishing Wizard specialized for the job. Developed by United States Plywood, each meets a variety of finishing needs. Keep all three "wizards" on hand.

Pre-seal fir plywood paint jobs with
WHITE FIRZITE®

A must for painting fir plywood! As an undercoater, White Firzite is a sealer and primer in one – it seals the pores to help avoid grain raise and checking. And if you want a woodsy blond, pickled, or wiped effect, start with White Firzite to get a real "pro" job without that painty look. (For pastel tones, add colors-in-oil.)

Pre-seal fir plywood stain jobs with
CLEAR FIRZITE

Tames wild grain on fir plywood, to rival the subdued beauty of more expensive woods. Helps to prevent grain raise and checking. And for oak, walnut, or mahogany effects, simply add colors-in-oil – it's easy to get the effect you want.

Get that modern natural finish with SATINLAC®

Satinlac emphasizes and protects the natural grain of any wood—hard or soft, plywood or solid lumber. Fast-dry for fast finishing... dries out of dust in 3 to 4 hours. Long lasting and a cinch to maintain.

Ask your hardware, paint, or lumber dealer about these Finishing Wizards... or mail coupon for FREE leaflets.

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Send me leaflets on:
☐ White Firzite ☐ Clear Firzite ☐ Satinlac

NAME_____
ADDRESS_____
CITY_____ ZONE____ STATE____

Mail For McCahill

[*Continued from page* 160]

● *The truth, Uncle Tom—would you rather be President of the U. S. or president of General Motors?*

Harry Richie
Omaha, Neb.

As I have less chance than Louis Lepke of becoming either, I'd like to split it up—two years as President of the U. S. during which I would try to force through a moratorium on all income tax for two years. Then two years as GM's prexy. *Then* two years in Paris in my "metal monster" with the door open.

● *I suppose you consider yourself the best automobile writer in the world. I dare you to answer this.*

H. C. Robinson
Louisville, Ky.

I certainly do not and no other automobile writer can consider himself the best as long as Terwilliger Muffinpuss is alive. *There* is a writer who gets to the soul of things. I will quote from his recent test of the Bent Water Biscuit Six: "Satisfactory mechanized transportation will be enjoyed by owners of the Bent Water Biscuit Six. Its lateral stability negotiating rounds and its ascending properties on vertical curves, not to mention its get-under-way dash, are truly astounding. This is particularly noticeable when the illuminated traffic control shows a green hue."

See what I mean?

● *Are you for or against Suffrage For Women?*

Irene M.
Providence, R. I.

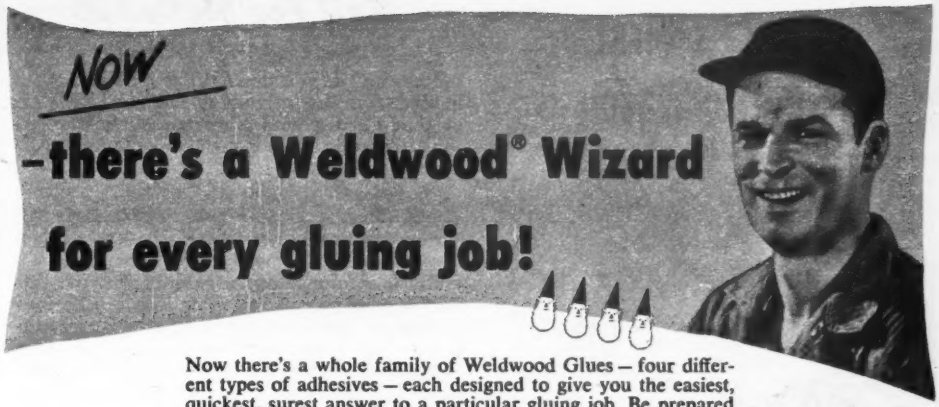
The more they suffer, the better.

● *It seems that most American car companies are now making competition models for stock car racing and speed trials. What possible good will this do for the man who wants a tamer version of the same models for general use?*

Edgar Cramer
Philadelphia, Pa.

For many years Indianapolis was the real proving ground for automotive development. Today's stock car racing and speed trials chase out bugs and structural weaknesses. These improvements filter down to the tamest models these factories build. If Manufacturer A builds a car and engine that can stand the strain of speed trials and stock car racing, what is learned along the way will mean that Isham Glockenfeather who buys the Broom Peddler's Special model will end up with a far

[*Continued on page* 164]



Now there's a whole family of Weldwood Glues — four different types of adhesives — each designed to give you the easiest, quickest, surest answer to a particular gluing job. Be prepared by keeping all four of these "wizards" at your workbench.

Bond instantly, permanently on contact with WELDWOOD CONTACT CEMENT

Great new way to put up plywood panels — without nails — or nail holes to finish. Perfect for applying Micarta and other plastic surfacing materials. 1001 uses for home, hobby, garage — Weldwood Contact Cement holds fast to any combination of wood, rubber, canvas or any other porous surface. 29¢, 40¢, 70¢ and larger.

Make wood-to-wood joints stronger than wood with WELDWOOD *Plastic Resin* GLUE

Pros and hobbyists alike rate it America's most popular wood glue. Weldwood Plastic Resin Glue makes joints that are actually stronger than the wood itself, and keep growing stronger. Economical, easy-to-mix powder. Highly water-resistant, stain and rot-proof. 15¢, 35¢, 65¢ and larger.

For all outdoor gluing—use WELDWOOD WATERPROOF RESORCINOL GLUE

So waterproof it *exceeds* government specifications for marine use! 100% reliable for boatwork; fixing sports equipment such as fishing rods; repairs in basements; making or mending outdoor furniture. Unaffected by climate, weather, water (even boiling, freezing and salt water!), mold, fungus, mild acids, alkalies, etc. ¼ pts., $1.00. Also available in pts., qts., gals.

Weldwood perfects a ready-to-use white glue— WELDWOOD PRESTO-SET® GLUE

Ready to use — sets fast — bonds like magic. So clean and easy to work with for scores of everyday household and hobby purposes. Use this Weldwood-perfected white glue to bond wood, cloth, paper, fabrics, etc., in any combination. Now in easy-to-use plastic dispensers. 19¢, 29¢, 49¢ and larger.

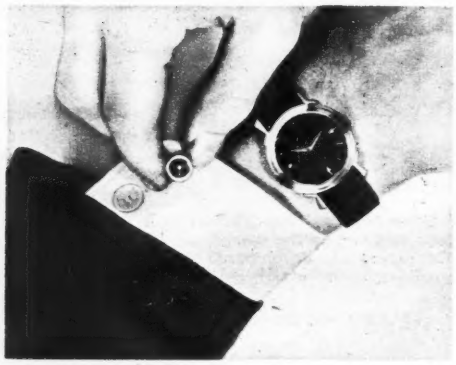
Remember—
There's a special Weldwood Wizard for every gluing job. Ask your lumber, paint or hardware dealer... or mail coupon for FREE leaflets.

UNITED STATES PLYWOOD CORPORATION
Box 525 — New York 46, N. Y. MI3-7G
Send me leaflets on:

- ☐ Weldwood Contact Cement
- ☐ Weldwood Plastic Resin Glue
- ☐ Weldwood Presto-Set Glue
- ☐ Weldwood Waterproof Resorcinol Glue

NAME_____
ADDRESS_____
CITY_____ ZONE____ STATE____

World's First Electric Watch



SHIRT-BUTTON size Energizer doles out just enough power needed by delicate mechanism.

A MARVEL of miniaturization and quite a bit more complicated than its famous ancestor—the sundial—the Hamilton Watch Company's revolutionary new wristwatch runs on electricity. Hamilton claims the mitey shirt-button size Energizer which powers the piece will run it for more than a year at an accuracy greater than 99.995 per cent. No larger than a conventional watch, it has one-third fewer parts and no mainspring. The delicate motor, which includes a coil made of wire five times finer than a human hair, drives the gears and turns the wheels. •

MOVEMENT of electric watch, right, shown next to that of a conventional wind-up piece.

Mail For McCahill

[*Continued from page* 162]

better car. If you don't think that Plymouth gained from the prowess of the Chrysler 300's or that Ford gained from the Mexican-winning Lincolns, then you just don't know the automobile business.

● *Another engineer and myself have invented a bumper which eliminates head-on collisions. The harder the two cars hit, the faster they glance off. Assuming we use two cars properly designed structurally with four inches of foam rubber throughout as suggested by safety engineers, and assuming safety belts and our bumpers are used, I believe two cars colliding at 70 mph would not even hurt the occupants. With the new cars using a lower center of gravity it is possible that neither car would turn over. While we are waiting to get someone to back us, hundreds or perhaps thousands of people will be needlessly killed by head-on collisions. Do you know of any automobile firm that would be interested?*

J. A. Gerson
8618 Rockford
Houston 16, Texas

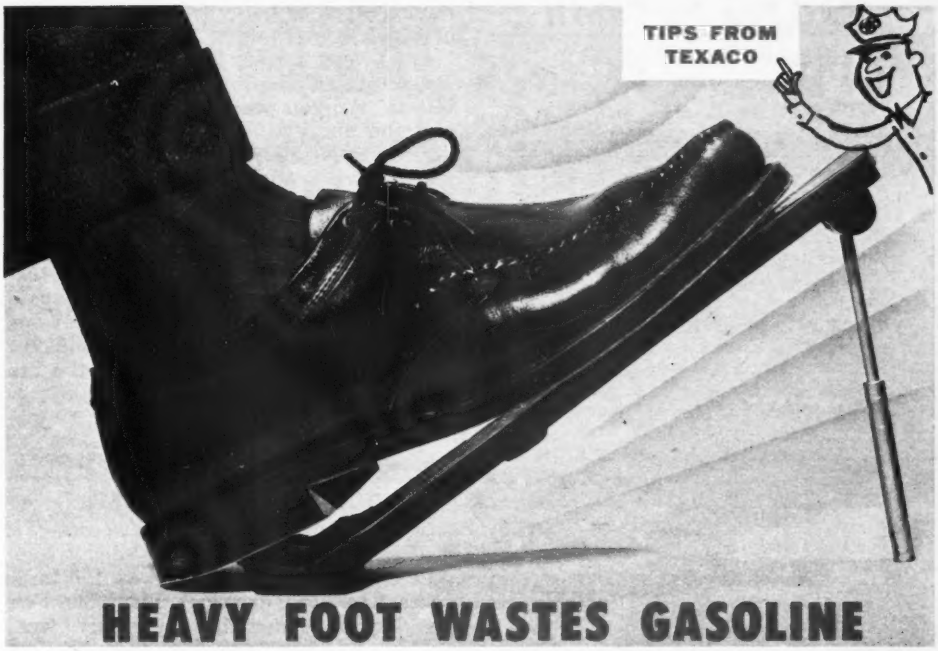
Frankly, I don't care to make the test but I hope you're right. I'm printing your full home address so that possibly one of my Detroit engineering readers will contact you.

● *This horsepower race going on in Detroit will just keep the highway deaths going up and up until something is done about it. Why don't you do your part and condemn them for it?*

M. B. Bolen
Cleveland, Ohio

First, let's get the score straight. Highway deaths have been going *down* for a number of years, based on the total number of cars in use—the only accurate way to figure highway safety statistics. In 1937, approximately 37,205 people were killed in motor vehicle accidents. There were 28,500,000 motor vehicles registered in America at that time. Though last-minute figures for 1956 are not available, there were approximately 60,000,000-plus vehicles in operation and approximately 42,000 deaths., In other words, more than twice as many vehicles were in operation in 1956 as in 1937. If the 1937 death rate had continued, about 75,000 would have been killed in 1956. I've written many articles on highway safety but let's not get balloon-headed about it—things *are* better.

[*Continued on page* 166]



HEAVY FOOT WASTES GASOLINE

CAR DRIVERS who *watch their footwork* can get up to 50% more mileage from a gallon of gasoline. Here are some ways they do it.

Smart drivers *take it easy*. A *"swoosh"* start or beating the other guy at the light takes up to 60% more gasoline. Nervous "pumping" of the accelerator pumps unneeded gas to the engine, gives an over-rich mixture, *lowers* performance, wastes gas.

So much for the accelerator. What about the brake? You make a gas investment to give the car momentum. Useless braking *kills momentum, wastes gas*. Rushing up to a red light, turn or traffic jam, and then screeching the brake wastes plenty. Look ahead, *plan a smooth even pace* and you'll save gas—maybe even lives.

So watch your footwork and save!

STAYS "LIGHT" WHEN COLD
—LESS STARTING DRAG

KEEPS "BODY" WHEN WARM
—SAVES ENGINE WEAR

Here's another gasoline saver:

Most motor oils get "stiff" when cool—drag on the engine when starting and warming up. Not so with *Havoline Special 10W-30*. Fully fluid when cold it saves gas by lessening starting and warm-up drag, yet stays full-bodied and full-lubricating when warm. Also it guards against engine deposits for clean, power-packed performance. Switch to *Havoline Special 10W-30*, use *less* gas, get more power. Get this ultra heavy duty motor oil from your Texaco Dealer. *the best friend your car has ever had.*

TEXACO DEALERS IN ALL 48 STATES

Texaco Products are also distributed in Canada, Latin America, and Africa

TUNE IN . . . Metropolitan Opera radio broadcasts every Saturday afternoon.
See newspaper for time and station.

THE TEXAS COMPANY

Mail For McCahill

[*Continued from page* 164]

● *Have you ever thought of growing a beard?*

Mrs. Emma Cook
Buffalo, N. Y.

Yep.

● *Isn't the turning back of used car speedometers out-and-out fraud? If you could prove it was done, couldn't the dealer be sued?*

Ken Meyers
Jamaica, L. I., N. Y.

Our Legal Department refuses to comment but let me say it's not the sort of cricket that Jack Armstrong, Gene Autry or George Washington would participate in. However, when I used to do it I was very careful not to get caught.

● *Which is the most expensive—a front end job or a rear end job?*

Billy Roberts
Syracuse, N. Y.

Whose?

—*Tom McCahill* •

Farm Hobbies That Pay

[*Continued from page* 66]

is something countrymen will do even if they're too busy—so why not make a buck on it? A Ft. Smith, Ark., man sells proven coon hounds at prices to match their varying ability in the woods. Naturally, there's only one way to find out what a hound's worth—take him out and see how many coons he can tree in a given period. Raising dogs is a business like any other, but *coon hunting*—

Lots of farmers are using their land to give other sports a go at the game—especially game birds which can be pen-raised and released to parties of hunters. Two farmers working together on such a project can pool acreage and effort and split the profits, which aren't bad at $25 a day for six released pheasant, lunch, guide and bird dog per hunter. State governments are encouraging this kind of game production. They're controlling it closely, too, so don't go into game bird raising without getting in touch with your state conservation commission.

Sports will also pay to fish stocked ponds, and many farmers have learned how to make this pay, though they do say it takes experience. At first you're either buying stock or being fished out—neither of which is profitable.

But every farmer can start *some* experimental sideline without sinking capital into it. All you need is the farm, the idea and the energy. Take the farmer who noticed what fancy prices folks were paying for trees and shrubs; he put some nursery stock on a field adjoining the highway and waited. Customers began knocking on his door and he was soon sold out. Besides the shrubs and trees people expected him to have the darndest things—flowers, bulbs, young cabbage, pepper and cauliflower plants, manure, lime—and now he's selling them all. Partly for the fun of it but mostly for the money! •

Home-Repair Gyps

[*Continued from page* 61]

It included the installation—at cost—of a combination garbage disposal-dishwasher unit and a free supply of soap for three years. The bargain price? Just $230. Few could resist. After the gyp outfit "went out of business," the bargain package turned out to be valued at under $100.

Right now law enforcement officers and Better Business Bureaus from coast-to-coast are desperately trying to alert all Americans—home-owners as well as city folk in apartment houses—against the ravages of the "switch" game. In this neat little art the technique is simple: advertise an irresistible bargain and then when the sucker is ready to buy, switch! Get him to buy something more expensive. The switch artist uses everything from outright lies to persuasive appeals to vanity. He invariably operates early in the working day when he can be reasonably sure the woman of the house is alone. The product advertised —called the "bait"—is usually a genuine bargain but, as they say in the racket, "It's nailed to the floor."

If you're smart enough to spot a "bait" advertisement you can forestall a switch by insisting on the original bargain, although you may have to fight like hell to get it. In most cases if you persist in wanting the bargain the salesman will curtly announce that it will be delivered to you. But that's the last you'll hear of it or of him.

One of the biggest baits todav is the lure

[*Continued on page* 168]

SENSATIONAL SPRING OFFER SAVES YOU $14.00

Famous Porter-Cable Model 136

3" BELT SANDER

Regularly 69.50

PLUS Bench Stand with miter gauge – Regularly 8.95

Total value 78.45

BOTH FOR ONLY $64.45

Limited time offer!

Get *two* quality Porter-Cable tools for a *special* low price of *one!* Buy Porter-Cable's popular 3" Belt Sander at a special low price of $64.45 and get a FREE Bench Stand with miter gauge, worth $8.95! You save $14.00 on both tools!

You'll want both of these quality Porter-Cable tools for doing all kinds of sanding jobs easier . . . faster . . . more professionally than ever! Don't pass up this terrific double value! See the yellow pages of the telephone book for name of your nearest Porter-Cable dealer—or use coupon for complete information. (Offer expires March 31, 1957.)

Porter-Cable

Quality Electric Tools

saws • belt sanders • finishing sanders
drills • routers • planes

In Canada: write Porter-Cable, Ltd., Box 5019, Ont., Canadian prices slightly higher.

SEE YOUR DEALER—OR MAIL COUPON TODAY!

PORTER-CABLE MACHINE CO.
7263 N. Salina St., Syracuse 8, N. Y.

Please send complete information on the special Spring offer that saves me $14.00 on the Model 136 3" Belt Sander and Bench Stand.

Name_____

Address_____

City_____ Zone____ State_____

Home-Repair Gyps

[*Continued from page* 166]

of astonishing bargains in storm doors and windows. It's not unusual for a switch outfit to offer storm windows at $7.77 each plus a free storm door and free installation. But when the salesman calls the line might go something like this:

"Shucks, mister, we didn't know you had such a nice home. These windows are all right for the price but they really belong in a much cheaper home. Of course, if you insist on having these I feel it's only fair to tell you that you'll have to brush them up once a week with steel wool to keep them from getting rusty and losing their shine." Before the salesman's through he's got the sucker convinced that storm windows costing three times as much are just as good a "bargain." They rarely, if ever, are.

A growing menace in the use of repair services is the gyp who poses as a phony inspector. Take, for instance, the phony who walked in on a Providence, R. I., housewife and said he was from the home heating and fuel "Safety Department." He meant from his own company but he made it sound official. The innocent housewife let him "check" the condition of her furnace and in a little while the "inspector" was up from the basement with a look of distress on his face.

"Madam, it's a lucky thing I came around when I did. The furnace of yours is in dangerous condition. Could have blown up any minute."

"What shall I do?" the shocked housewife asked.

"You'll have to shut it down. And I warn you not to start it up again."

Luckily, the inspector knew a repairman who would come over immediately in an emergency. In a few minutes the repairman—actually a confederate from his here-today-gone-tomorrow outfit—was at the house with a pickup truck full of tools and spare parts. Before the hour was up the housewife had signed on the dotted line for nearly $250 worth of repairs and new parts.

Special targets for the gyp kings are home-owners who have, or had, FHA-insured loans for home repairs and improvements. The fakers come around as FHA inspectors, saying they merely want to check up on the condition of your property. They spring the gag that if you've had FHA assistance you're obligated to keep your home in good condition. Naturally, they always find something wrong and they always know the right man who could fix things up in a hurry at a bargain price. The FHA constantly warns that it has no such inspectors but that doesn't faze the gyps who rake in fast profits from one town after another.

In Kerrville and Corpus Christi, Texas, scores of home-owners got stung by a couple of sharpies who "inspected" their homes for termite and insect infestation and succeeded in selling them worthless exterminating chemicals.

Of course, not every bargain is bait for the switch gyp. Most merchants are reputable. Most repair contractors and servicemen are honest. But if this causes you to let your guard down, you're playing with fire.

What can you do to protect yourself? First, make sure you alert the women of your household. Then follow this advice I have compiled from such sources as the FTC, the FHA and Better Business Bureaus:

1. Never deal with an individual or firm whose reputation is not known to you.
2. Never sign a contract, sales slip, or certification of "satisfactory completion" of a job without reading what you sign, especially the fine print.
3. Remember that an FHA-insured loan for home improvement or repairs is no guarantee or protection.
4. Never deal with a salesman who tries to talk you out of an advertised bargain.
5. If the merits of a product sound too good to believe, check up before you buy.
6. Beware offers from pitchmen who want to use your home as a "model."
7. Unless you are sure of the outfit you're dealing with, always get more than one estimate on a home-repair job.
8. Don't be won over by long-term guarantees.
9. If anyone comes posing as an inspector of any kind, ask for absolute identification.

Stick to these rules and chances are the gyp artists will have to ring someone else's doorbell. If you have any doubt at all about the caller at your door, you can't lose by saying, "No, thanks!" •

Here's the oil filter that invites you to keep careful tab yourself. MoPar Micronic Oil Filters keep engines purring longer because they trap corrosive, abrasive particles down to .000039 of an inch . . . take out one *third* more dirt per square inch of filtering surface . . . offer a surface over 8 times that of conventional types. MoPar Filters fit most makes of cars. Make sure you get MoPar Parts — *official, authentic* Chrysler Corporation Parts, available from your local Plymouth, Dodge, De Soto, Chrysler or Imperial dealer.

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PARTS & ACCESSORIES

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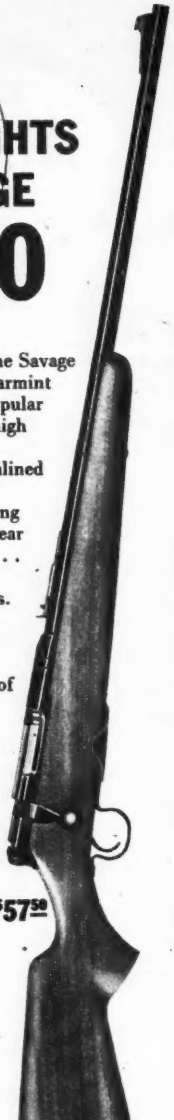
DETROIT 31, MICHIGAN

SET YOUR SIGHTS ON THE SAVAGE 340



It's always "open season" with the Savage 340 . . . chambered for 2 great varmint cartridges and America's most popular deer caliber. Stock has medium-high comb and trim lines for steady handling, fine balance and streamlined appearance.

This rugged bolt action repeating rifle has a ramp front sight and rear sight with elevation adjustment . . . drilled and tapped for popular receiver sights and 'scope mounts. Available in 3 great calibers:

.222 Remington 50 grain bullet
The advanced design of the 340 brings out the ballistic potential of this high velocity, flat-shooting cartridge.

.22 Hornet 45 grain bullet
An economical cartridge that delivers peak accuracy in the Savage 340.

.30-30, 150 and 170 grain bullets
For more than 50 years it has proved its effectiveness on deer and medium-sized game.

$57.50

The 340's exclusive head space control and specialized Savage manufacturing methods give you extreme accuracy at a price so low you can buy the 340 complete with 'scope for less than you might expect to pay for the rifle alone. See it at your dealer's now.

There is a complete line of Savage, Stevens and Fox shotguns and rifles for every shooter and every kind of shooting. *Write for free rifle or shotgun catalog. Savage Arms Corp., Chicopee Falls 20, Mass.*

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ALL PRICES SUBJECT TO CHANGE . . . SLIGHTLY HIGHER IN CANADA

The '57 Rambler

[*Continued from page* 89]

Though my test car was not equipped with power steering, the steering was so light I felt there was not too much need for power. In '56 I found the steering hard on the Rambler wagon. For you broom-peddlers on a dime-a-mile allowance, the Rambler still features a Six. The Rambler, in my opinion, could stand a little sharpening in the styling department but you can't beat it for the man who doesn't need 50 feet of flight deck and tailfins to hold onto as he staggers out of his garage. •

Tests FC-150 Jeep

[*Continued from page* 93]

basket is 77½ inches, or a good 20 inches higher than the typical '57 passenger car) I could see right over the roofs of all the other cars on the road. Even their high beams didn't bother me way up there and it was easy for me to weave in and out. I could see where I was going and the other cars couldn't. In going across mud trails as slick as the belly of an oiled eel, the underseat mounting of the front wheels accentuates the whipping around in the slime somewhat. Going down rocky 20-35 per cent grades you're much more conscious of the terrain than you are sitting back a few feet in my standard Jeep.

So what's the FC-150 all about? Well, here is a pickup rig capable of carrying a dozen kegs of beer across the icy wastes to starved Lapland reindeer or for smuggling a whole still right out from under the eye of the revenooers. On the farm this job will go to work feeding cattle or rounding-up livestock weeks before the spring-soaked fields would permit such an operation in the average pickup truck. Under all but the most extreme conditions, milk and feed deliveries can be made through deep snow without having to use chains or other barbaric aids to propulsion.

As a hunting and sportsman's car this job can't be approached by anything built in the country today. It wouldn't take the imagination of a mongoose to use the bolt-in stake holes for rigging up an enclosed canvas or metal shelter behind the cab for full stretch-out sleeping room, plus space

[*Continued on page* 172]

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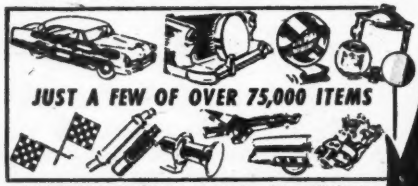

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Name_____

Address_____

City_____ State_____

Tests FC-150 Jeep

[*Continued from page* 170]

for cooking equipment and a few dozen dogs. For taking out across the West on an elk hunt or over the Long Island veldt to a field trial, this new Jeep would prove a lot more practical than mine, which is just about big enough to carry one dog, another passenger, our guns and a supply of Alka-Seltzer and toothbrushes. Though I wouldn't trade my own Jeep for a half-interest in a salami factory, it wouldn't take much arm-twisting to get me to go for this job. In its ugly little way it is extremely good-looking, due to its functional properties and its practical aspects. If I owned one (and it's not beyond the realm of possibility that I might) I'd make two changes at once, as earlier outlined: the installation of decent seats and a hopped-up heater. By the way, the steering wheel is the horizontal bus type. Though this requires mostly the same arm muscles used in conventional car steering, your reactions in an emergency might not be as sharp as they would be in the family junker until you've had quite a few hours practice with it.

In summing up, here is a great piece of equipment—the true evolution of a basic war tool. It's as rugged as an Olympic weight-lifter and as able as a three-armed Irishman in a saloon fight. In rural work the uses this little bucket can be put to would fill the New York telephone classified directory. Available accessories make this job handier than being married to a safe-blower when you want to open Junior's piggy bank.

From three take-off points, saws, welding equipment, generators and even water pumps can be quickly hooked up to run off the FC-150 engine. You don't have to be a brain to realize what this could mean to frontiersmen, ranchers and farmers. Tie this up with the fact that this vehicle will go when the others say "No!" and you have transportation with unlimited possibilities. The speedometer reads from "0" to "9." Though I'm positive it'll do more than nine mph it would take three barrels of hemp to sell me on a 90-mph figure (I *think* that's what the "9" stands for). Zero to 60 mph and top-speed figures on a vehicle like this seem unnecessary. But the 0-50 mph time on a hardtop road,

just to give you an idea, is a 15.3 seconds. But picture that road slick with ice, leading right uphill, when the traffic light turns green. At a time like this the FC-150 Jeep would leave the Chrysler 300's, Pontiacs and fuel-injection Chevy's as if they were standing still—which probably is just what they'd be doing under those circumstances. •

In Civil Engineering

[*Continued from page* 82]

establish roots and rear a family without barnstorming hither and yon. And if you want it the other way, your job can send you to nearly every part of the world. Right now, civil engineers are building air bases in Iceland and Greenland, draining swamps in the jungles of South America, building railroads and dams in the Canadian wilderness. They are on the job in the turbulent Middle East, in North Africa, on the deserts of the Americas and the plains of China.

If you want to travel, if you want to live in strange regions, learn new customs, see the world and its inhabitants at close range, a civil engineering career offers you the chance.

Income? In 1955, average starting pay for CE's with private firms was $4,100, ranging up to $6,100. Present starting pay is higher.

Income rises rapidly as a man advances in experience. Check the recent help wanted ads for proof. On a single day, this was being offered: $16,000 for a chief hydraulics engineer; $12,000 for a highway engineer; $10,000 for a materials engineer; $9,000 plus expenses for a soils engineer in South America; $9,000 for an assistant chief sanitary engineer. Top engineers get $25,000 to $35,000 and even more.

How do you join the ranks of civil engineers? If you are in high school, soak up as much science and math as you can. Generally, engineering schools want you to have a year and a half of high school algebra, a year of plane geometry, a half year of trigonometry, and a year of physics. It's a good idea to check your program with your high school adviser.

It's also a good idea to look up the entrance requirements and courses of study offered at the various engineering schools. You can obtain a list of the nation's good

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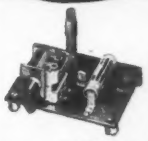
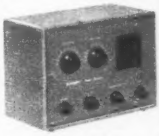


Transistor Radio Kit

Experiment with the marvel of transistors! Printed circuit mounting board simplifies assembly—just make a few solder connections. Delivers fine broadcast reception. Fits in palm of your hand; powered by penlight cell that lasts for months. Complete with all parts, transistor, penlight cell. Shpg. wt., 2 lbs.

83 Y 765. Transistor Radio Kit.... $4.35

83 Y 298. Headset & Antenna Kit... $3.15



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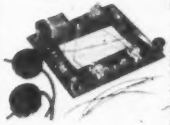
83 Y 243. "Space-Spanner" Kit.. $15.95

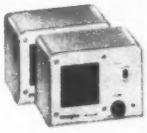
83 Y 247. Cabinet for above..... $2.98



Transistorized Electronic 10-in-1 Lab Kit

Sensational—work with transistors! Assemble the basic parts, then complete project after exciting project (10 of them in all) just by plugging leads into proper jacks on printed-circuit board—no wiring changes needed. Make the following: AM radio, amplifier, wireless broadcaster, code practice oscillator, electronic timer, switch, flasher, or any of 3 other electronic relays. Includes all parts, 2 transistors, battery, headphones and instructions for each project. Shpg. wt., 3 lbs.

83 Y 290. Electronic Lab Kit.... $15.45



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engineering schools and their curricula by writing to the Engineers Council for Professional Development, 29 West 39th St., New York 18, N. Y., and enclosing 25 cents.

If you are starting at a later age, and from a job, the approach is different but the possibilities of achieving your goal are excellent. My suggestion is this: Get your foot in the door by finding a job, any sort of job, in engineering. Try a construction company, a State highway department, a city engineer's office. Ask to do anything, in the office or out in the field.

Once in, you work and you watch. And then you study. Enroll in night school and you can be on your way. William T. Cavanaugh, executive secretary of the Engineering Manpower Commission of Engineers Joint Council, reports that many thousands of eager young fellows work during the day and take the night school route toward an engineering career.

Many have already made it and are now full-fledged civil engineers. Others will get there, but it takes time, hard work and staying power. It's easier if you are already working in an engineering office because you find the inspiration there, plus some practical answers to problems that may come up.

The correspondence school route is still another path toward engineering. Some professional engineers have been able to achieve their professional status by studying this way. As a matter of fact, I have seen quite a number of applications for membership in the ASCE state that engineering training was obtained in correspondence schools. A list of such schools may be obtained from the Secretary, National University Extension Association, Bloomington, Ind.

Home study is one good way of becoming an engineering technician and that brings up this important point:

If civil engineers are needed now, skilled engineering technicians are needed just as much. Studies show that the average requirement is five technicians for every one professional engineer.

A technician is the fellow who does work requiring some of the knowledge and skills of both the engineer and the skilled craftsman. He generally specializes in one aspect of engineering.

How do you get to be a technician? Institutions offering training are located

[*Continued on page* 186]

AT LAST, AN AIR FILTER THAT REALLY PROTECTS YOUR ENGINE!

New FRAM *FILTRONIC* CARBURETOR AIR FILTER obsoletes all other air filter types

TIME WAS when your new-car manual warned: *Service your air filter every 1,000 miles.* It had to be! If you let it slide, engine wear jumped alarmingly as a result of abrasive dust and dirt passed by the already loaded filter. Cleaning efficiency dropped sharply and it was costly to keep your filter serviced.

THE AMAZING NEW FRAM "FILTRONIC" CARBURETOR AIR FILTER ends all that! Here's the air filter that performs mile after mile with a bare minimum of attention. It *keeps* its high efficiency—99.+% through all its life! No abrasive dirt or dust can by-pass it. Engine wear is cut up to 90%! And, it's a cinch to service! Takes but a minute or two to remove the specially-developed dry-type cartridge, clean it and re-install.

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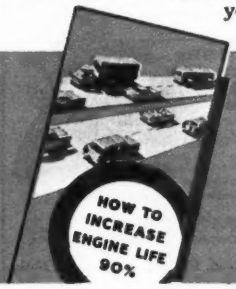

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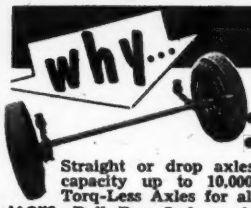

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1169 E. Colorado St., Pasadena 1, Calif.

How To Tap A Phone

[*Continued from page* 156]

formers and be sure that R4 is the right value.

If no sound is heard, check the battery polarity and make sure that the transistors are inserted properly. If this fails to produce results, a check of the schematic against your unit is in order.

Now plug in the phone pickup jack for a final test. Turn on the amplifier and place the pickup coil underneath the base of your telephone. Remember, it must be the kind of telephone which has its transformer in the base and not in a separate box on the wall. In the latter case, the pickup coil of course must be placed near the wall box. At any rate, you should now be in business and all your family or friends will be able to listen in comfort to long distance calls. •

PARTS LIST

V1 Transistor; GE 2N107
V2 Transistor (same as V1)
V3 Transistor (same as V1)
V4 Transistor (same as V1)
T1 Transformer; Argonne No. AR-104
T2 Transformer; Argonne No. AR-109
T3 Transformer; Argonne No. AR-119 (AR-120 for 10 ohm speakers)
C1 Condenser, 2 uf 15 v; Lafayette No. CF-120
C2 Condenser, 6 uf 15 v; Lafayette No. CF-121
C3 Condenser, 50 uf 15 v; Lafayette No. CF-125
C4 Condenser, (same as C1)
R1 Resistor, 470 K
R2 Resistor, 150 K
R3 Potentiometer, 5 K, volume control with switch
R4 Resistor, 33 K
R5 Resistor, 68 ohms
R6 Resistor, 12 ohms
R7 Resistor, 4,700 ohms
B1 Mercury cell battery, 9 v; RCA No. VS 300
J1 Jack; Switchcraft No. 42A
SP Speaker, 4-in.; Lafayette No. SK-11

MISCELLANEOUS

Quantity	*Part*
1	Meter case; ICA No. 3996
1	Circuit board; Lafayette No. MS-306
1	Plug; Switchcraft No. 750
1	Male snap; Lafayette No. 11733
1	Female snap; Lafayette No. 11734
1	Knob; Lafayette No. MS-186
1	Battery holder;
2	pkgs. Flea clips; Lafayette No. MS-263
2	Brackets; Lafayette No. MS-344
2	Brackets; Lafayette No. 14895
	Screws; nuts; solder; No. 24 hookup wire; 6-in. spaghetti; grille cloth.

Note: All parts may be purchased from Lafayette Radio, 165-08 Liberty Ave., Jamaica 23, N. Y.

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Free Details and "How to Weld"

Personalized Ash Trays

[*Continued from page* 117]

enamel for reuse. The paper must be kept clean because any dirt can cause imperfections in the enamel.

The tray is next coated with the gum solution. Use a large artist's brush and spread it evenly, leaving no bare spots. Then cover the mouth of the enamel container with the stocking and shake a fine spray of enamel on the wet tray surface. Coat it evenly, but not too heavily.

With the enamel applied, allow the gum to dry. Get the kiln going and allow 15 or 20 minutes for it to come up to temperature. Then place the tray in the kiln and close the lid. Observe the tray every minute or so and you will see the enamel beginning to melt. When the surface has become wavy, remove the tray and allow it to cool on a piece of asbestos.

The surface of the tray should be examined carefully when the tray has cooled. All bubbles are punctured with the pointed instrument and all roughness is ground down with the emery paper. Also clean the underside of the tray with steel wool to remove the flaky copper oxide, otherwise it will pop off in the kiln and cause imperfections in the enamel.

Once again the gum and enamel are applied and the tray is fired in the kiln. This time, however, you will be rewarded with a smooth, glossy surface.

Figures, letters, pictures or any design may be applied now by painting the design with a brush in gum, dusting the tray with the desired color and tapping off the excess as shown. When the gum has dried, the figures will be easily trimmed with point and blade. The tray is then refired. Fire only one color at a time and you will get the best results.

The best way to clean a completed tray is by immersing it in a diluted solution of nitric acid. A little rubbing will then do the trick. Apply a thin, clear lacquer to the underside to prevent tarnishing. •

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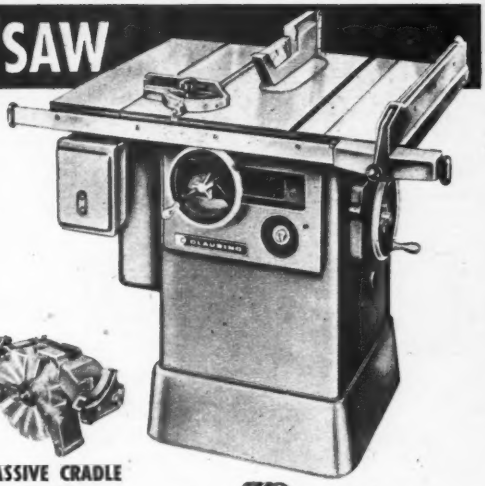

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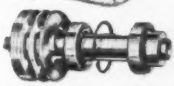

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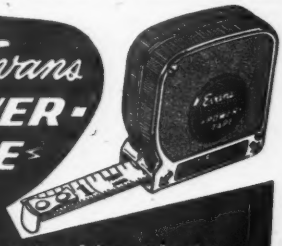

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FIELD-TESTED SINCE 1922

Phono-Bar

[*Continued from page* 133]

Use 1x1-in. hardwood stock to build a frame around the front edge of the amplifier compartment. After cutting out the front panel ($\frac{3}{16}$-in. Masonite) and boring holes for mounting screws and controls, screw it to the frame. Cut the shelf to size and install.

Laminate veneer to all exposed interiors except the amplifier housing. The laminating is accomplished without clamps—with Plastic Laminate Adhesive (Sears, Roebuck & Co.) which is applied as per manufacturer's instructions. After veneering, give both pieces a light finish sanding. Fit, cut and laminate $\frac{1}{16}$-in. sheet cork (automobile gasket cork) to all interior sides, top of record changer drawer and amplifier housing. Again use the plastic laminate adhesive.

The cabinets are now ready for finishing. After applying three or four coats of sealer (sanding lightly between coats) spray approximately seven coats of lacquer (sanding lightly between coats). Leave the last coat unsanded to dry thoroughly overnight. After the lacquer is completely set you may obtain an additional gloss by rubbing the cabinet with pumice and water, rubbing lightly *with* the grain of the wood. Let dry and apply a coat of good quality paste wax.

On the baffle plate locate the speaker mounting holes and drill guide holes for Tee nuts which are then hammered into the panel from the front. Now, paint the complete front of the panel, including the Tee nuts, using black paint; this prevents the board from showing through the grille. When dry, cover the board with grille cloth. A lightly woven porous plastic material is recommended so that the high frequencies are not impeded. Stretch the cloth around the edges of the board and secure at the rear with tacks or staples. This same method is used in adhering the fabric to the sliding doors. The baffle plate is now attached with screws to the 1x1-in. hardwood frame, from the *inside*, using 1½-in. wood screws every four inches (to minimize vibration). Do not use glue.

Before mounting the speakers, install a turnbuckle and wire tension, as shown in

[*Continued on page* 182]

Golden Hammer Award Winners

[*Continued from page* 115]

. . . Mario Negreiros, Dos Anjos, Santa Rosa, Brazil . . . Deane D. Willey, Council Bluffs, Iowa . . . George R. Johnson, Jr., Lynn, Mass. . . . John L. Dreher, Jr., Nashville, Tenn. . . . Lynn S. Cressler, Mason, Mich. . . . Dave Butcher, Portland, Ore. . . . Edward T. Schoenberger, Brooklyn, N. Y. . . . Billy J. Watkins, Cape Girardeau, Mo. . . . Doug Harkin, Waterdown, Ont. . . . Ernest DeMaio, Jr., Brooklyn, N. Y. . . . John H. Chapman, Houston, Tex. . . . Coen Oosthuysen, Vereeniging, Transvaal, S. Africa . . . Chester E. Kauffman, Ventura, Calif. . . . Robert L. Savage, Dayton, Ohio . . . Roy L. Alsterlind, San Francisco, Calif. . . . G. W. Bray, Fort Worth, Tex. . . . S/Sgt. J. T. Sherwood, Indian Springs, Nev. . . . William H. Crocker, Jr., Cambridge, Mass. . . . Robert Pope, Chicago, Ill. . . . S. R. Peterson, Longview, Wash. . . . Edward C. Greuling, Dayton, Ohio . . . Henry P. Carroll, Seattle, Wash. . . . Byron H. Fowlu, Englewood, Col. . . . James W. Stewart, Barberton, Ohio . . . R. S. Nel, Johannesburg, S. Africa . . . Joseph Radock, Belle Vernon, Pa. . . . Nathan K. Young, Nashville, Tenn. . . . Steve Claassen, Berkeley, Calif. . . . Marvin B. Burba, Clyde, Ohio . . . Edwin Miller, Topeka, Kan.

The following craftsmen have been awarded CERTIFICATES OF MERIT for their projects:

Joe Powell, Amherst, Canada . . . Chester E. Kauffman, Ventura, Calif. . . . Francis G. Biddlecombe, Batavia, N. Y. . . . Glen Palmer, White City, Kan. . . . James E. Hyde, Newtonville, N. Y. . . . Frank Sdesta, Jr., Newark, N. J. . . . Benedict P. Bamburk, Scotch Plains, N. J. . . . Jan Anderson, Decatur, Ill. . . . Raymond Salazar, Chicago, Ill. . . . William Allan Nagel, Plant City, Fla. . . . Carlos Cardona, New York, N. Y. . . . George E. Virgines, Northlake, Ill. . . . Joseph D. Souza, Fall River, Mass. . . . Raymond R. Paprocki, Tonawanda, N. Y. . . . Thomas E. Day, Trenton, N. J. . . . Irving Thompson, Buffalo, N. Y. . . . James H. Boggs, Dayton, Ohio . . . Walter M. Novak, Dorchester, Mass. . . . Jim Lick, Portland, Colo. . . . Julio Maringlane, Brooklyn, N. Y. . . . Ensil B. Polen, Eggertsville, N. Y. . . . H. R. Morrison, Jr., South Norfolk, Va. . . . John Q. Mahon, Norfolk, Va. . . . Walter B. Gogan, Dalton, Mass. . . . Chuck Jesse, Niles City, Mont. . . . Louis B. Frank, Tacoma, Wash. . . . Edward J. Anson, Harrow, Ontario, Canada . . . Eileen Whiston, Lancs., England . . . Lawrence Repinski, Milwaukee, Wis. . . . D. J. Merrell, Houston, Tex. . . . Mable Smiley, San Bernardino, Calif. . . . Allyn Barnett, Coleman, Tex. . . . Robert W. Johnson, Faribault, Minn. . . . Max Holtman, Twin Valley, Minn. . . . Duane O. Kloppel, Bassett, Neb. . . . Jim Masters, Baltimore, Md. . . . Ronald Levesque, Epping, N. H. . . . Earl Rittgers, Logan, Ohio . . . Russell Barnett, East Jordan, Mich. . . . Edgar R. Low, San Saba, Tex. . . . P. Tominelli, Brooklyn, N. Y. . . . Lewis van Wyk, Alberton, S. Africa . . . Fred J. Klein, San Francisco, Calif. . . . Grant Eads, Granite City, Ill. . . . Moss Man M. Greene, Ancon, Panama . . . John Lesko, Clifton, N. J. . . . Gail D. Wilson, Minneapolis, Minn. . . . Ed A. Daggett, Albany, N. Y. Watch for the names of more winners next month. •

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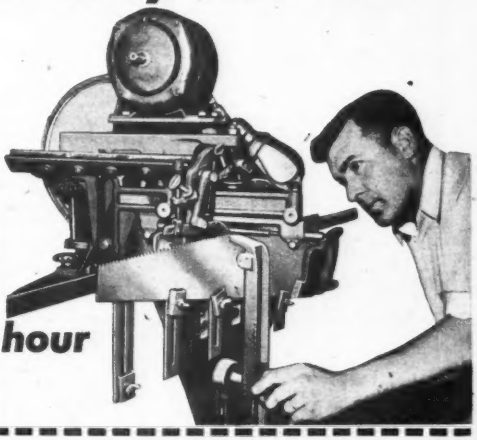

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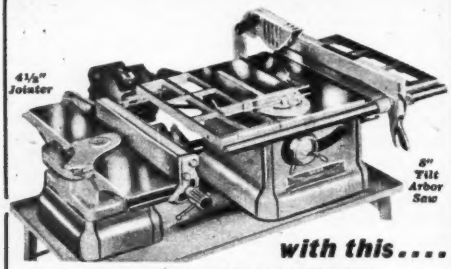

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Storage Bench

[*Continued from page* 123]

inches. Nail and glue in place and attach the top section.

If you wish, the back of the bench frame can be fastened to the wall with wood screws driven into the wall studs. When you do this, first locate the stud positions, then pre-drill through the plaster walls. You will have to use screws 4 in. or longer to hold the 2x3 frame.

Next, cut the three front uprights, with both ends angled so the bottom edge fits against the upright, while the front is ¼-in. back of the top frame edge. In this way, you will be able to nail on the ¼-in. plywood front cover. It will be a bit tricky to get the correct angle, so try first with scrap wood until you get it just right. Strips of narrow molding nailed on the lower 2x3 frame will give additional backing for the plywood.

A suitable bench pad is made of 1- or 2-in. thick foam rubber sheeting which is now widely available at reasonable cost. The foam rubber is easily cut to size with ordinary household shears, and a simple covering can be sewed for it. •

Phono-Bar

[*Continued from page* 180]

the drawings. This stabilizes the top and bottom of the enclosure and cuts vibration and resonance. Staple or tack the Fiberglas insulation to the inside top, sides, bottom and back panels. Lay the cabinet on its face to mount the speakers.

Follow the manufacturer's instructions for hooking up the speakers to the amplifier. When soldering, remember to let the part cool slowly to avoid getting a cold joint. When you are sure that your wiring is correct and all components are hooked up properly, install the rear panel with 1¼-in. wood screws.

The components used in this enclosure are: two Wharfedale 8-in. speakers (Super S/CS/AL); Grommes 12 watt amp/preamp and model XA-100 Miracord automatic changer. If you decide to use other components with substantially different dimensions, you will naturally have to alter the cabinets accordingly. •

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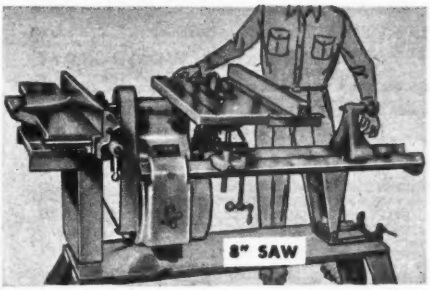

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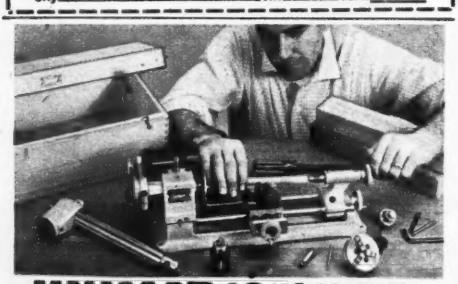

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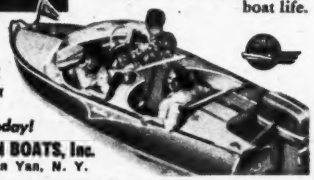

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Craig Craft Tonawanda, N. Y.

Battery Tester

[*Continued from page* 141]

socket. On this same lug attach another piece of wire and run it to one of the lugs on the second light socket. From the same lug on the second light socket run a wire to one of the lugs on the third light socket. Continue in this fashion until each light socket has been connected together on one side only; solder all connections. This completes the negative or ground side.

Now, on the unused lug of the first light socket solder a twelve inch piece of brown hook-up wire. The other end of this wire goes to terminal No. 1 of the six-connection terminal strip. From the unused lug of the second light socket solder a twelve inch piece of red wire. The other end attaches to terminal No. 2 of the terminal strip. The same procedure is followed for all the other light sockets, being sure to use a wire of a different color for each one to identify each indicator light with the proper cell in the battery.

At the battery you will note a small breather hole through the center of each one of the caps. Use a drill to enlarge these holes to accommodate the carbon rods, as shown in the drawing. The carbon rods may be obtained from used flashlight batteries—the non-leakproof type or the lead from a heavy drawing pencil. About $\frac{3}{16}$-in. from the enlarged breather hole drill a new breather. Now, take the carbon rods and fit one into each of the battery caps. It should be a tight fit. However, if you find that it isn't, a few drops of Duco cement will solve this problem. Before cementing the rods in place be sure that they are adjusted properly as follows: first fill each cell to its normal level, then adjust the carbon rods so that when the battery caps are screwed down, the rods will extend into the electrolyte about ⅛ to ¼ inch.

With the battery caps and carbon rods in place slip a grid cap over the end of each rod. These caps can be purchased for a few cents from any radio supply store. Measure off enough brown, red, orange, etc., wire to reach from the battery to the dashboard. These wires can be run through plastic tubing or laced with waxed cord and run through the firewall via any existing hole.

[*Continued on page* 187]

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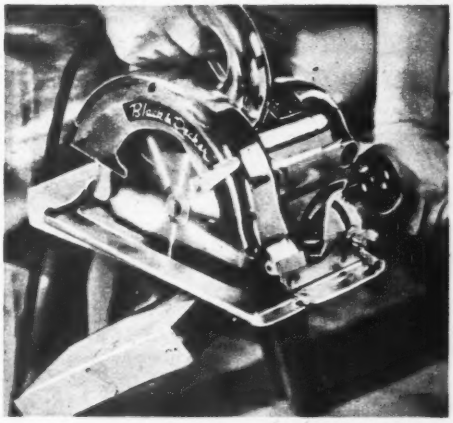

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In Civil Engineering

[*Continued from page* 174]

in all parts of the country. These are technical institutes, junior colleges, specialized private schools and extension divisions of colleges and universities.

Neither the civil engineer nor the technician has a soft job. Civil engineering, despite the *average* 40-hour week, is no job for a clock-watcher. There will be lots of hard physical work and periods of mental stress. At the start, there may be stretches of dull, routine work. And there's the risk—accidents do happen.

But weigh these against the satisfaction of contributing something tangible to mankind and civilization, of helping to improve the health and welfare of the human race and of seeing a dream take shape from drawings on a board to a magnificent structure of steel and stone. Few careers can offer you that. •

Their Ship Came In. . .

[*Continued from page* 100]

replica that was accurate in every detail and color to its full-size counterpart. When the Johnson people saw it they gave K & O exclusive world-wide rights to use the name of Johnson in their miniatures. Les and Clair later obtained similar rights to the Evinrude, Mercury and Scott-Atwater outboard designs.

These little motors measure 5⅝ in. in length, are electrically operated and precision-made of die cast aluminum.

The tiny outboards propel their craft through the water at close to four feet per second. Harmless to the fingers, they can be clamped to a cocktail glass and make excellent mixers.

Duplicating in miniature name brand equipment buoyed K & O's gross sales. The company now ranks as the largest manufacturer of built-up boats in the world.

Besides the ready-made boats, K & O also supplies materials for model boat building hobbyists.

K & O's low-priced inroads into the field of high quality toys have established a name and fortune for Les McDonough and Clair Oberly, two ex-fliers who will be the first to admit that their ship literally came in—from Tokyo. •

Battery Tester

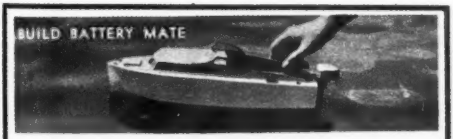
[*Continued from page* 185]

Locate the heavy braided ground strap that runs from the battery to the frame of your car and solder the brown wire to the grid cap on the rod nearest this ground strap. This will be cell No. 1. Solder the red wire to the next grid cap (cell No. 2), the orange wire to the next grid cap (cell No. 3) and so on until all the wires in the cable have been connected to their respective grid caps. This completes the wiring at the battery.

Going back to the terminal strip at the control panel attach the brown wire from the battery to the terminal holding the brown wire from the control panel. Repeat this procedure with the rest of the wires until all wire colors have been matched and wires connected. This completes all of the wiring.

The final step will be to install the light bulbs and attach the control panel to the dashboard. Some experimenting may have to be done in selecting the correct size of light bulbs due to the different voltages present at each cell in the battery. We used a 1.5 volt bulb for cell No. 1; a 3.5 volt bulb for cell No. 2; a 6 volt bulb for cell No. 3 and 6-8 volt bulbs for cells Nos. 4, 5 and 6.

Due to the fact that the light sockets are mounted so close to each other it will be necessary to mask each bulb so that light will not leak through adjacent pilot light jewels. This can be accomplished by painting each light bulb black except for a small portion directly in line with the jewel. The control panel may be painted to match the interior color of your car or left natural and sprayed with clear plastic. Operation and wiring for the 6 volt system is identical with the 12 volt type except that only 3 cells, lights, etc., are used. •



Using a battery-powered outboard motor, this handsome model really performs beautifully. Construction is mostly of balsa, with plywood added where extra strength is required. For your copy of these complete, full size plans, remit 50 cents to MECHANIX ILLUSTRATED Plans Service, Fawcett Bldg., Greenwich, Conn. Please specify Plan No. 420.

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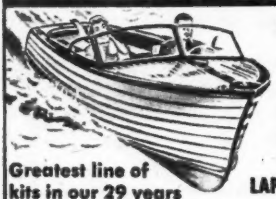

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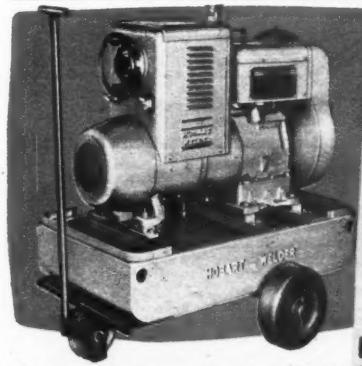

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[*Continued from page* 152]

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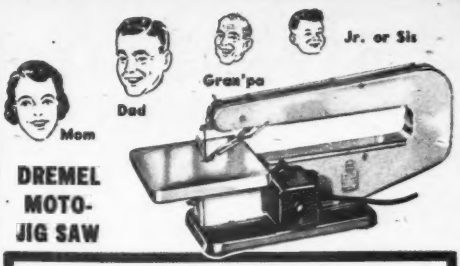

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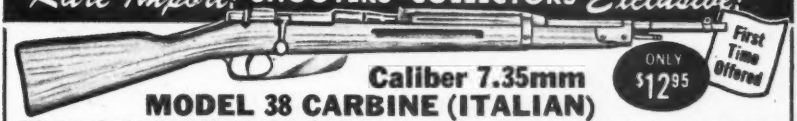

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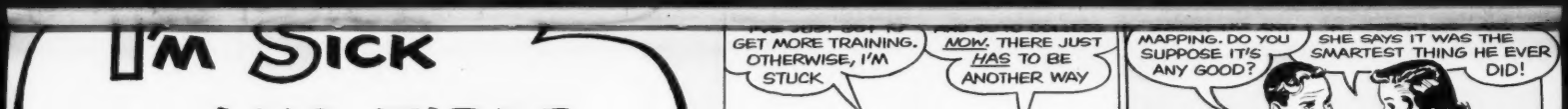
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GET MORE TRAINING. OTHERWISE, I'M STUCK
NOW, THERE JUST HAS TO BE ANOTHER WAY
MAPPING. DO YOU SUPPOSE IT'S ANY GOOD?
SHE SAYS IT WAS THE SMARTEST THING HE EVER DID!

I'M SICK AND TIRED OF WAITING!

1. EVERYTHING COMES TO HIM WHO WAITS? THAT'S A LAUGH. I WAITED FOR THE BREAK. WAITED 'TIL I WAS SICK OF IT. HOW LONG CAN A GUY WITH A WIFE AND KIDS GO ON DREAMING?

2. MY WIFE AND I THOUGHT ABOUT IT, TALKED ABOUT IT, WORRIED ABOUT IT. WE WERE STUMPED. WE THOUGHT WE HIT A DEAD END

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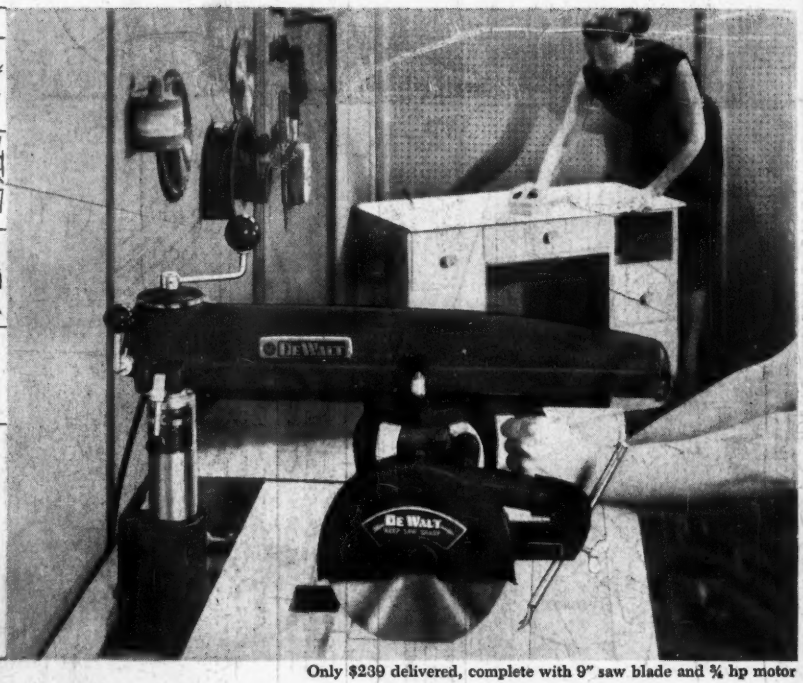

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